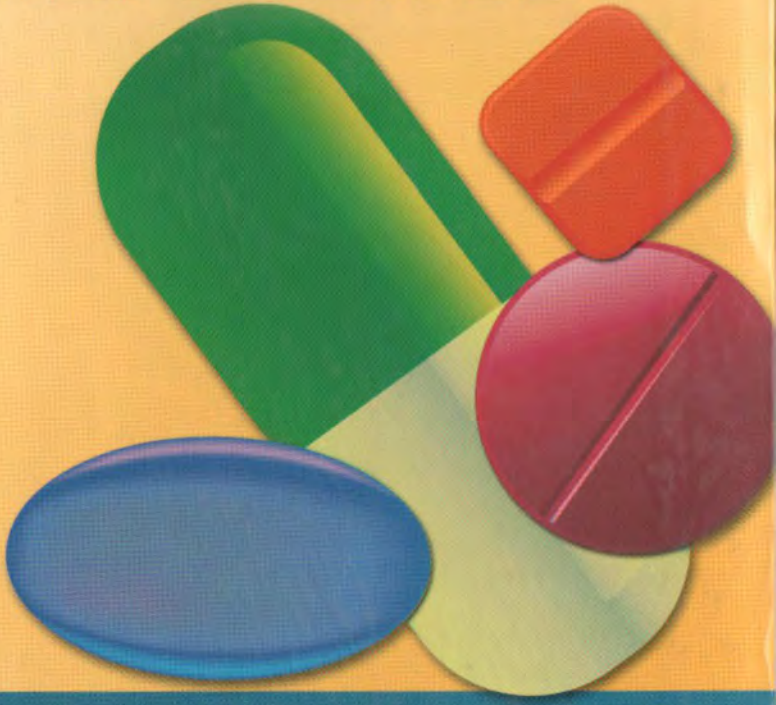
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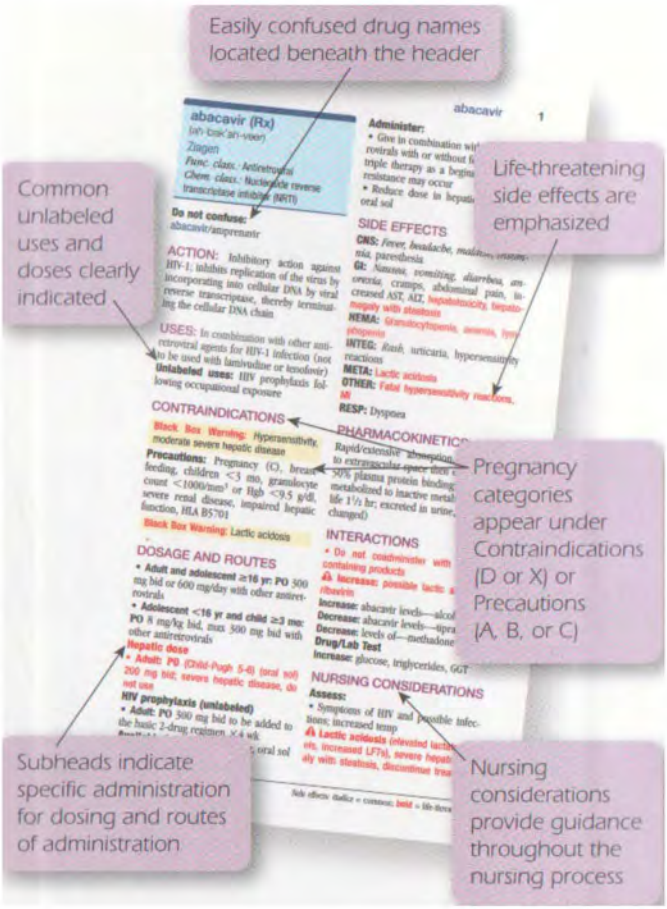
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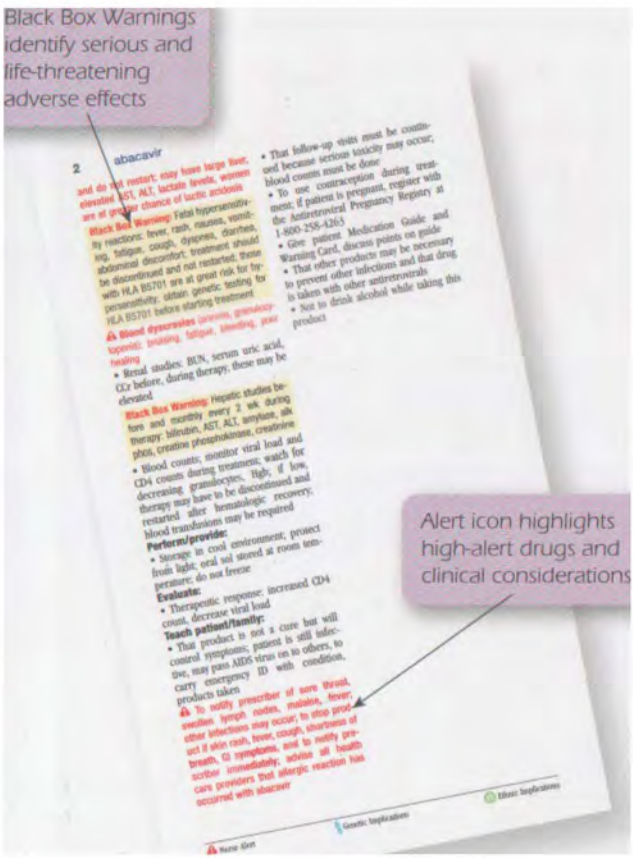
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للكتب (كوردى ، عربي ، فارسي)


Easily confused drug names located beneath the header
Common unlabeled uses and doses clearly indicated
Life-threatening side effects are emphasized
Pregnancy categories appear under Contraindications (D or X) or Precautions (A, B, or C)
Subheads indicate specific administration for dosing and routes of administration
Nursing considerations provide guidance throughout the nursing process
abacavir (Rx)
(ah-bak'ah-veer)
Ziagen
Func. class.: Antiretroviral
Chem. class.: Nucleoside reverse transcriptase inhibitor (NRTI)
Do not confuse:
abacavir/amprenavir
ACTION:
USES:
CONTRAINDICATIONS
Black Box Warning:
Precautions:
DOSAGE AND ROUTES
HIV prophylaxis (unlabeled)
SIDE EFFECTS
CNS:
GI:
INTERACTIONS
NURSING CONSIDERATIONS
Assess:


Black Box Warnings identify serious and life-threatening adverse effects
2 abacavir
and do not restart; may have large fever, elevated AST, ALT, lactate levels, women are at greater chance of lactic acidosis
Black Box Warning: Fatal hypersensitivity reactions: fever, rash, nausea, vomiting, fatigue, cough, dyspnea, diarrhea, abdominal discomfort; treatment should be discontinued and not restarted; those with HLA B5701 are at great risk for hypersensitivity; obtain genetic testing for HLA B5701 before starting treatment
Blood dyscrasias (anemia, granulocytopenia): bruising, fatigue, bleeding, poor healing
• Renal studies: BUN, serum uric acid, CCr before, during therapy; these may be elevated
Black Box Warning: Hepatic studies before and monthly every 2 wk during therapy: bilirubin, AST, ALT, amylase, alk phos, creatine phosphokinase, creatinine
• Blood counts; monitor viral load and CD4 counts during treatment; watch for decreasing granulocytes; high, if low, therapy may have to be discontinued and restarted after hematologic recovery; blood transfusions may be required
Perform/provide:
• Storage in cool environment; protect from light; oral sol stored at room temperature; do not freeze
Evaluate:
• Therapeutic response: increased CD4 count, decrease viral load
Teach patient/family:
• That product is not a cure but will control symptoms; patient is still infective, may pass AIDS virus on to others, to carry emergency ID with condition, products taken
To notify prescriber of sore throat, swollen lymph nodes, malaise, fever; other infections may occur; to stop product if skin rash, fever, cough, shortness of breath, GI symptoms, and to notify prescriber immediately; advise all health care providers that allergic reaction has occurred with abacavir
• That follow-up visits must be continued because serious toxicity may occur; blood counts must be done
• To use contraception during treatment, if patient is pregnant, register with the Antiretroviral Pregnancy Registry at 1-800-258-4263
• Give patient Medication Guide and Warning Card, discuss points on guide
• That other products may be necessary to prevent other infections and that drug is taken with other antiretrovirals
• Not to drink alcohol while taking this product
Alert icon highlights high-alert drugs and clinical considerations
Nurse Alert
Genetic Implications
Ethnic Implications

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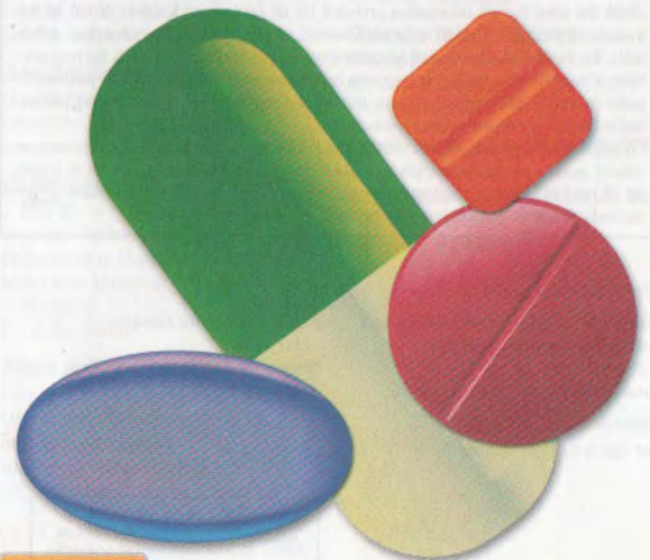
- **Drug Monographs**
 Additional monographs for drugs found in practice.
- **Combination Drugs**
 A comprehensive list of combination products found commonly in the market.
- **Drug Monographs—Recently Approved**
 A table of drugs approved by the FDA after publication of the book, including links to approved product inserts.
- **English-to-Spanish—Assessment, Teaching, and Related Terms**
 Spanish translations and pronunciations for common drug phrases and terms.

Mosby's 2014 NURSING DRUG REFERENCE

Mosby's 2014 NURSING DRUG REFERENCE

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Preface

Increasingly, patients are relying on nurses to know every detail of health care. More important, nurses are expected to have these answers, especially when it comes to medication. Let *Mosby's 2014 Nursing Drug Reference* be your answer. Our indispensable, yet compact, resource contains hundreds of monographs with several easy-to-use features.

NEW FEATURES

This edition features:

- A beautiful, full-color design to spotlight critical and safety-related information
- More than 20 recent FDA-approved drugs located throughout the book and in **Appendix A** (see Contents for a complete list). Included are monographs for:
 - ivacaftor (Kalydeco)—for cystic fibrosis
 - lucinactant (Surfaxin)—for newborn respiratory distress
 - pertuzumab (Perjeta)—for breast cancer
- Newly added complete monographs for select ophthalmic, otic, nasal, and topical products
- A new ebook with easy-to-use navigation for quick access to drug monographs of your choice

NEW FACTS

This edition features more than 2000 new drug facts, including:

- New drugs and dosage information
- Newly researched side effects and adverse reactions
- New and revised Black Box Warnings
- The latest precautions, interactions, and contraindications
- IV therapy updates
- Revised nursing considerations
- Updated patient/family teaching guidelines

ORGANIZATION

This reference is organized into three main sections:

- Drug categories
- Individual drug monographs (in alphabetical order by generic name)
- Appendixes (identified by the wide, blue thumb tabs on the edge)

The guiding principle behind this book is to provide fast, easy access to drug information and nursing considerations. Every detail—the paper, typeface, cover, binding, use of color, and appendixes—has been carefully chosen with the user in mind.

INDIVIDUAL DRUG MONOGRAPHS

This book contains monographs for more than 1300 generic and 4500 trade medications. Common trade names are given for all drugs regularly used in the United States and Canada, with drugs available only in Canada identified by a maple leaf 🍁.

The following information is provided, whenever possible, for safe, effective administration of each drug:

High-alert status: Identifies high-alert drugs with a label and icon. Visit the Institute for Safe Medication Practices (ISMP) at http://www.ismp.org/tools/highalertmedications.pdf for a list of medications and drug classes with the greatest potential for patient harm if they are used in error.

Tall man lettering: Uses the capitalization of distinguishing letters to avoid medication errors and is required by the FDA for drug manufacturers.

Pronunciation: Helps the nurse master complex generic names.

Rx/OTC: Identifies prescription or over-the-counter drugs.

Functional and chemical classifications: Allow the nurse to see similarities and dissimilarities among drugs in the same functional but different chemical classes.

Do not confuse: Present drug names that might easily be confused within each appropriate monograph.

Action: Describes pharmacologic properties concisely.

Uses: List the conditions the drug is used to treat.

Unlabeled uses: Describe drug uses that may be encountered in practice but are not yet FDA approved.

Dosages and routes: List all available and approved dosages and routes for adult, pediatric, and geriatric patients.

Available forms: Include tablets, capsules, extended-release, injectables (IV, IM, SUBCUT), solutions, creams, ointments, lotions, gels, shampoos, elixirs, suspensions, suppositories, sprays, aerosols, and lozenges.

Side effects: Groups these reactions by body system, with common side effects *italicized* and life-threatening reactions (those that are potentially fatal and/or permanently disabling) in **bold, red type** for emphasis.

Contraindications: List conditions under which the drug absolutely should not be given, including FDA pregnancy safety categories D or X.

Precautions: List conditions that require special consideration when the drug is prescribed, including FDA pregnancy safety categories A, B, or C.

Black Box Warnings: Identify FDA warnings that highlight serious and life-threatening adverse effects.

Pharmacokinetics: Outlines metabolism, distribution, and elimination.

Interactions: Include confirmed drug interactions, followed by the drug or nutrient causing that interaction, when applicable.

Drug/herb: Highlight potential interactions between herbal products and prescription or OTC drugs.

Drug/food: Identifies many common drug interactions with foods.

Drug/lab test: Identifies how the drug may affect lab test results.

Nursing considerations: Identify key nursing considerations for each step of the nursing process: Assess, Administer, Perform/Provide, Evaluate, and Teach Patient/Family. Instructions for giving drugs by various routes (e.g., PO, IM, IV) are included, with route subheadings in bold.

Compatibilities: List syringe, Y-site, and additive compatibilities and incompatibilities. If no compatibilities are listed for a drug, the necessary compatibility testing has not been done and that compatibility information is unknown. To ensure safety, assume that the drug may not be mixed with other drugs unless specifically stated.

"Nursing Alert" icon ⚠: Highlights a critical consideration.

Treatment of overdose: Provides drugs and treatment for overdoses where appropriate.

APPENDIXES

Selected new drugs: Includes comprehensive information on 23 key drugs approved by the FDA during the past 12 months.

Ophthalmic, otic, nasal, and topical products: Provides essential information for more than 80 ophthalmic, otic, nasal, and topical products commonly used today, grouped by chemical drug class.
Vaccines and toxoids: Features an easy-to-use table with generic and trade names, uses, dosages and routes, and contraindications for 43 key vaccines and toxoids.

I am indebted to the nursing and pharmacology consultants who reviewed the manuscript and thank them for their criticism and encouragement. I would also like to thank Robin Carter and Shephali Graf, my editors, whose active encouragement and enthusiasm have made this book better than it might otherwise have been. I am likewise grateful to Joy Moore and Graphic World Inc. for the coordination of the production process and assistance with the development of the new edition.

Linda Skidmore-Roth

FDA pregnancy categories

A	No risk demonstrated to the fetus in any trimester
B	No adverse effects in animals; no human studies available
C	Only given after risks to the fetus are considered; animal studies have shown adverse reactions; no human studies available
D	Definite fetal risks, may be given in spite of risks if needed in life-threatening conditions
X	Absolute fetal abnormalities; not to be used at any time during pregnancy

Note: **UK** = Unknown fetal risk (used in this text but not an official FDA pregnancy category)

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- lucinactant
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- perampanel
- pertuzumab
- regorafenib
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- Additional Monographs
- Canadian Resources (high-alert Canadian medications, Canadian controlled substance chart, Canadian recommended immunization schedule for infants and children)
- Chemotherapeutic Agents—Safe Handling
- Combination Products
- Content Changes
- Controlled Substance Chart
- Drugs Metabolized by Known P450s
- Drug Monographs—Recently Approved
- Drugs to Use Cautiously for Geriatric Patients
- English-to-Spanish—Assessment, Teaching, and Related Terms
- Herbal Products
- Patient Teaching Guide—English and Spanish

α-ADRENERGIC BLOCKERS

ACTION: α-Adrenergic blockers act by binding to α-adrenergic receptors, causing dilation of peripheral blood vessels. Lowers peripheral resistance, resulting in decreased B/P.

USES: α-adrenergic blockers are used for benign prostatic hyperplasia, pheochromocytoma, prevention of tissue necrosis and sloughing associated with extravasation of IV vasopressors.

CONTRAINDICATIONS: Hypersensitive reactions may occur, and allergies should be identified before these products are given. Patients with MI, coronary insufficiency, angina, or other evidence of CAD should not use these products.

Administer:
- Starting with low dose, gradually increasing to prevent side effects
- With food or milk for GI symptoms

SIDE EFFECTS: The most common side effects are hypotension, tachycardia, nasal stuffiness, nausea, vomiting, and diarrhea.

PHARMACOKINETICS: Onset, peak, and duration vary among products.

INTERACTIONS: Vasoconstrictive and hypertensive effects of EPINEPHrine are antagonized by α-adrenergic blockers.

POSSIBLE NURSING DIAGNOSES:

- Risk for injury *[adverse reactions]*
- Insomnia *[adverse reactions]*
- Impaired urinary elimination *[uses]*

NURSING CONSIDERATIONS

Assess:
- Electrolytes: K, Na, Cl, CO_2
- Weight daily, I&O
- B/P lying, standing before starting treatment, q4hr thereafter
- Nausea, vomiting, diarrhea
- Skin turgor, dryness of mucous membranes for hydration status

Evaluate:
- Therapeutic response: decreased B/P, increased peripheral pulses

Teach patient/family:
- To avoid alcoholic beverages
- To report dizziness, palpitations, fainting
- To change position slowly or fainting may occur
- To take product exactly as prescribed
- To avoid all OTC products (cough, cold, allergy) unless directed by prescriber

SELECTED GENERIC NAMES

α 1 blockers
silodosin
tamsulosin

ANESTHETICS—GENERAL/LOCAL

ACTION: Anesthetics (general) act on the CNS to produce tranquilization and sleep before invasive procedures. Anesthetics (local) inhibit conduction of nerve impulses from sensory nerves.

USES: General anesthetics are used to premedicate for surgery, induction and maintenance in general anesthesia. For local anesthetics, refer to individual product listing for indications.

CONTRAINDICATIONS: Persons with cerebrovascular accident, increased intracranial pressure, severe hypertension, cardiac decompensation should not use these products since severe adverse reactions can occur.

Precautions: Anesthetics (general) should be used with caution in the geriatric, CVD (hypotension, bradydysrhythmias), renal/hepatic disease, Parkinson's

disease, children <2 yr. The precaution for anesthetics (local) is pregnancy.

Administer:

- Anticholinergic preoperatively to decrease secretions
- Only with crash cart, resuscitative equipment nearby

SIDE EFFECTS: The most common side effects are dystonia, akathisia, flexion of arms, fine tremors, drowsiness, restlessness, and hypotension. Also common are chills, respiratory depression, and laryngospasm.

PHARMACOKINETICS: Onset, peak, and duration vary widely among products. Most products are metabolized in the liver and excreted in urine.

INTERACTIONS: MAOIs, tricyclics, phenothiazines may cause severe hypotension or hypertension when used with local anesthetics. CNS depressants will potentiate general and local anesthetics.

POSSIBLE NURSING DIAGNOSES:

General:

- Risk for injury *[adverse reactions]*
- Deficient knowledge *[teaching]*

Local:

- Deficient knowledge *[teaching]*
- Acute pain *[uses]*

NURSING CONSIDERATIONS

Assess:

- VS q10min during IV administration, q30min after IM dose

Perform/provide:

- Quiet environment for recovery to decrease psychotic symptoms

Evaluate:

- Therapeutic response: maintenance of anesthesia, decreased pain

SELECTED GENERIC NAMES (INJECTABLES ONLY)

General anesthetics

droperidol
etomidate
fentaNYL
fentaNYL/droperidol
fentaNYL transdermal
fospropofol
midazolam
propofol
thiopental

Local anesthetics

lidocaine
procaine
ropivacaine
tetracaine

ANTACIDS

ACTION: Antacids are basic compounds that neutralize gastric acidity and decrease the rate of gastric emptying. Products are divided into those containing aluminum, magnesium, calcium, or a combination of these.

USES: Antacids decrease hyperacidity in conditions such as peptic ulcer disease, reflux esophagitis, gastritis, and hiatal hernia.

CONTRAINDICATIONS: Sensitivity to aluminum or magnesium products may cause hypersensitive reactions. Aluminum products should not be used by persons sensitive to aluminum; magnesium products should not be used by persons sensitive to magnesium. Check for sensitivity before administering.

Precautions: Magnesium products should be given cautiously to patients with renal insufficiency and during pregnancy and breastfeeding. Sodium content of antacids may be significant; use with caution for patients with hypertension, congestive heart failure or for those on a low-sodium diet.

Administer:

- Not to take other products within 1-2 hr of antacid administration because antacids may impair absorption of other products
- All products with an 8-oz glass of water to ensure absorption in the stomach
- Another antacid if constipation occurs with aluminum products

SIDE EFFECTS: The most common side effect caused by aluminum-containing antacids is constipation, which may lead to fecal impaction and bowel obstruction. Diarrhea occurs often when magnesium products are given. Alkalosis may occur when systemic products are used. Constipation occurs more frequently than laxation with calcium carbonate. The release of CO_2 from carbonate-containing antacids causes belching, abdominal distention, and flatulence. Sodium bicarbonate may act as a systemic antacid and produce systemic electrolyte disturbances and alkalosis. Calcium carbonate and sodium bicarbonate may cause rebound hyperacidity and milk-alkali syndrome. Alkaluria may occur when products are used on a long-term basis, particularly in persons with abnormal renal function.

PHARMACOKINETICS: Duration is 20-40 min. If ingested 1 hr after meals, acidity is reduced for at least 3 hr.

INTERACTIONS: Effects of the following products may be increased by some antacids: quiNIDine, amphetamines, pseudoephedrine, levodopa, valproic acid, dicumarol. Effects of the following products may be decreased by some antacids: cimetidine, corticosteroids, ranitidine, iron salts, phenothiazines, phenytoin, digoxin, tetracyclines, ketoconazole, salicylates, isoniazid.

POSSIBLE NURSING DIAGNOSES:

- Constipation *[adverse reactions]*
- Diarrhea *[adverse reactions]*
- Chronic pain *[uses]*

NURSING CONSIDERATIONS

Assess:

- Aggravating and alleviating factors of epigastric pain or hyperacidity; identify the location, duration, and characteristics of epigastric pain
- GI symptoms, including constipation, diarrhea, abdominal pain; if severe abdominal pain with fever occurs, these products should not be given
- Renal symptoms, including increasing urinary pH, electrolytes

Evaluate:

- Therapeutic response: absence of epigastric pain, and decreased acidity

SELECTED GENERIC NAMES

aluminum hydroxide
bismuth subsalicylate
calcium carbonate
magnesium oxide
sodium bicarbonate

ANTI-ALZHEIMER AGENTS

ACTION: Anti-Alzheimer agents improve cognitive functioning by increasing acetylcholine and inhibiting cholinesterase in the CNS. Do not cure condition, but improve symptoms.

USES: Anti-Alzheimer agents are used for the treatment of Alzheimer's symptoms.

CONTRAINDICATIONS: Persons with hypersensitivity reactions should not use these products.

Precautions: Anti-Alzheimer agents should be used cautiously in pregnancy (C), breastfeeding, sick sinus syndrome,

GI bleeding, bladder obstruction, and seizures.

Administer:

- Lowest possible dose for therapeutic result; adjust dose to response

SIDE EFFECTS: The most common side effects are nausea, vomiting, diarrhea, dry mouth, insomnia, dizziness, as well as urinary frequency, incontinence, and rash. The most serious side effects are seizures and dysrhythmias.

PHARMACOKINETICS: Onset, peak, and duration vary widely among products. Most products are metabolized in the liver and excreted by the kidneys.

INTERACTIONS: Increased synergistic reactions may occur with succinylcholine, cholinesterase inhibitors, and cholinergic agonists. There may be a decrease in the action of anticholinergics, and there may be additive effects when used with cholinergic agents.

POSSIBLE NURSING DIAGNOSES:

- Chronic confusion *[uses]*
- Deficient knowledge *[teaching]*
- Noncompliance *[teaching]*

NURSING CONSIDERATIONS

Assess:

- B/P, hypotension, hypertension
- Mental status: affect, mood, behavioral changes, depression, confusion
- GI status: nausea, vomiting, anorexia, diarrhea
- GU status: urinary frequency, incontinence

Perform/provide:

- Assistance with ambulation during beginning therapy if dizziness, ataxia occur

Evaluate:

- Therapeutic response: decrease in confusion, improved mood

Teach patient/family:

- To report side effects, adverse reactions to health care provider
- To use exactly as prescribed, at regular intervals
- Not to increase or abruptly decrease dose; serious consequences may result
- That product is not a cure but relieves symptoms

SELECTED GENERIC NAMES

donepezil
galantamine
memantine
rivastigmine

ANTIANGINALS

ACTION: Antianginals are divided into the nitrates, calcium channel blockers, and β-adrenergic blockers. The nitrates dilate coronary arteries, causing decreased preload, and dilate systemic arteries, causing decreased afterload. Calcium channel blockers dilate coronary arteries and decrease SA/AV node conduction. β-Adrenergic blockers decrease heart rate so that myocardial O_2 use is decreased. Dipyridamole selectively dilates coronary arteries to increase coronary blood flow.

USES: Antianginals are used in chronic stable angina pectoris, unstable angina, vasospastic angina. Some (i.e., calcium channel blockers and β-blockers) may be used for dysrhythmias and in hypertension.

CONTRAINDICATIONS: Persons with known hypersensitivity, increased intracranial pressure, or cerebral hemorrhage should not use some of these products.

Precautions: Antianginals should be used with caution in postural hypotension, pregnancy, breastfeeding, children, renal disease, and hepatic injury.

SIDE EFFECTS: The most common side effects are postural hypotension, headache, flushing, dizziness, nausea,

edema, and drowsiness. Also common are rash, dysrhythmias, and fatigue.

PHARMACOKINETICS: Onset, peak, and duration vary widely among coronary products. Most products are metabolized in the liver and excreted in urine.

INTERACTIONS: Interactions vary widely among products. Check individual monographs for specific information.

POSSIBLE NURSING DIAGNOSES:

- Decreased cardiac output *[adverse reactions]*
- Risk for injury *[uses]*
- Deficient knowledge *[teaching]*
- Acute pain *[uses]*
- Ineffective cardiac tissue perfusion *[uses]*

NURSING CONSIDERATIONS

Assess:

- Orthostatic B/P, pulse
- Pain: duration, time started, activity being performed, character
- Tolerance if taken over long period
- Headache, light-headedness, decreased B/P; may indicate a need for decreased dosage

Perform/provide:

- Storage protected from light, moisture; place in cool environment

Evaluate:

- Therapeutic response: decrease, prevention of anginal pain

Teach patient/family:

- To keep tabs in original container
- Not to use OTC products unless directed by prescriber
- To report bradycardia, dizziness, confusion, depression, fever
- To take pulse at home, advise when to notify prescriber
- To avoid alcohol, smoking, sodium intake
- To comply with weight control, dietary adjustments, modified exercise program
- To carry emergency ID to identify product that you are taking, allergies
- To make position changes slowly to prevent fainting

SELECTED GENERIC NAMES

Nitrates
isosorbide
nitroglycerin

β-Adrenergic blockers
atenolol
dipyridamole
metoprolol
nadolol
propranolol

Calcium channel blockers
amLODIPine
diltiazem
niCARdipine
NIFEdipine
verapamil

Miscellaneous
ranolazine

ANTIANXIETY AGENTS

ACTION: Benzodiazepines potentiate the action of GABA, including any other inhibitory transmitters in the CNS resulting in decreased anxiety. Most agents cause a decrease in CNS excitability.

USES: Anxiety is relieved in conditions such as generalized anxiety disorder and phobic disorders. Benzodiazepines are also used for acute alcohol withdrawal to prevent delirium tremens, and some products are used for relaxation before surgery.

CONTRAINDICATIONS: These products are contraindicated in hypersensitivity, acute closed-angle glaucoma, children <6 mo, hepatic disease (clonazepam), and breastfeeding (diazepam).

Precautions: Antianxiety agents should be used cautiously in geriatric or debilitated patients. Usually smaller doses are needed because metabolism is slowed.

Persons with renal/hepatic disease may show delayed excretion. ClonazePAM may increase the incidence of seizures.

Administer:

- With food or milk for GI symptoms; may give crushed if patient is unable to swallow whole (tabs only, no controlled- or sustained-release products)

SIDE EFFECTS: The most common side effects are dizziness, drowsiness, blurred vision, and orthostatic hypotension. Most adverse reactions are mediated through the CNS. There is the potential for abuse and physical dependence with some products.

PHARMACOKINETICS: Most of these agents are metabolized by the liver and excreted via the kidneys.

INTERACTIONS: Increased CNS depression may occur when given with other CNS depressants. These products should be used together cautiously. Alcohol should not be used, as fatal reactions have occurred. The serum concentration and toxicity may be increased when used with benzodiazepines.

POSSIBLE NURSING DIAGNOSES:

- Anxiety *[uses]*
- Risk for injury *[adverse reactions]*
- Deficient knowledge *[teaching]*

NURSING CONSIDERATIONS

Assess:

- B/P (lying and standing), pulse; if systolic B/P drops 20 mm Hg, hold product and notify prescriber; orthostatic hypotension can be severe
- Hepatic/renal studies: AST, ALT, bilirubin, creatinine, LDH, alk phos
- Physical dependency and withdrawal with some products, including headache, nausea, vomiting, muscle pain, and weakness after long-term use

Evaluate:

- Therapeutic response: decreased anxiety, increased relaxation

Teach patient/family:

- That product should not be used for everyday stress or long-term use; not to take more than prescribed amount because product is habit forming
- To avoid driving and activities that require alertness because drowsiness and dizziness may occur
- To abstain from alcohol, other psychotropic medications unless directed by prescriber
- Not to discontinue abruptly; after extended periods, withdrawal symptoms may occur

SELECTED GENERIC NAMES

Benzodiazepines

ALPRAZolam
chlordiazePOXIDE
clonazePAM
diazepam
LORazepam
midazolam
oxazepam
temazepam
triazolam

Miscellaneous

busPIRone
doxepin
hydrOXYzine
PAROxetine
venlafaxine

ANTIASTHMATICS

ACTION: Bronchodilators are divided into anticholinergics, α/β-adrenergic agonists, β-adrenergic agonists, and phosphodiesterase inhibitors. Also included in antiasthmatic agents are corticosteroids, leukotriene antagonists, mast cell stabilizers, and monoclonal antibodies. Anticholinergics act by inhibiting interaction of acetylcholine at receptor sites on bronchial smooth muscle. α/β-Adrenergic agonists act by relaxing bronchial smooth muscle and increasing diameter of nasal passages. β-Adrenergic

agonists act by action on β_2-receptors, which relaxes bronchial smooth muscle. Phosphodiesterase inhibitors act by blocking phosphodiesterase and increasing cAMP, which mediates smooth muscle relaxation in the respiratory system. Corticosteroids act by decreasing inflammation in the bronchial system. Leukotriene receptor antagonists decrease leukotrienes, and mast cell stabilizers decrease histamine; both act to decrease bronchospasm.

USES: Antiasthmatics are used for bronchial asthma; bronchospasm associated with bronchitis, emphysema, or other obstructive pulmonary diseases; Cheyne-Stokes respirations; and prevention of exercise-induced asthma. Some products are used for rhinitis and other allergic reactions.

CONTRAINDICATIONS: Persons with hypersensitivity, closed-angle glaucoma, tachydysrhythmias, and severe cardiac disease should not use some of these products.

Precautions: Antiasthmatics should be used with caution in breastfeeding, pregnancy, hyperthyroidism, hypertension, prostatic hypertrophy, and seizure disorders.

Administer:

- Inhaled product after shaking; exhale, place mouthpiece in mouth, inhale slowly, hold breath, remove, exhale slowly
- PO product with meals to decrease gastric irritation

SIDE EFFECTS: The most common side effects are tremors, anxiety, nausea, vomiting, and irritation in the throat. The most serious adverse reactions are bronchospasm and dyspnea.

PHARMACOKINETICS: Onset, peak, and duration vary widely among products. Most products are metabolized by the liver and excreted in urine.

INTERACTIONS: Interactions vary widely among products. Check individual monographs for specific information.

POSSIBLE NURSING DIAGNOSES:

- Activity intolerance *[uses]*
- Ineffective airway clearance *[uses]*
- Risk for injury *[adverse reactions]*
- Deficient knowledge *[teaching]*
- Noncompliance *[teaching]*

NURSING CONSIDERATIONS

Assess:

- Respiratory function: vital capacity, forced expiratory volume, ABGs, lung sounds, heart rate and rhythm, aggravating and alleviating factors

Perform/provide:

- Storage of inhaled product in light-resistant container; do not expose to temps over 86° F (30° C)
- Gum, small sips of water for dry mouth

Evaluate:

- Therapeutic response: decrease severity and number of asthma attacks; absence of dyspnea, wheezing

Teach patient/family:

- To avoid hazardous activities; drowsiness or dizziness may occur with some products
- To obtain blood work as required; some products require blood levels to be drawn
- Avoid all OTC medications unless approved by provider
- To report side effects, including insomnia, heart palpitations, light-headedness; these side effects may occur with some products

SELECTED GENERIC NAMES

Bronchodilators

albuterol
arformoterol
atropine
formoterol

ipratropium
levalbuterol
terbutaline
theophylline
tiotropium

Adrenergics
EPINEPHrine

Corticosteroids
beclomethasone
betamethasone
budesonide
cortisone
dexamethasone
flunisolide
fluticasone
hydrocortisone
methylPREDNISolone
predniSONE
triamcinolone

Leukotriene antagonists
zafirlukast

Mast cell stabilizers
cromolyn

Monoclonal antibodies
omalizumab

ANTICHOLINERGICS

ACTION: Anticholinergics inhibit the muscarinic actions of acetylcholine at receptor sites in the autonomic nervous system. Anticholinergics are also known as antimuscarinic products.

USES: Anticholinergics are used for a variety of conditions: decreasing involuntary movements in parkinsonism (benztropine, trihexyphenidyl); bradydysrhythmias (atropine); nausea and vomiting (scopolamine); and as cycloplegic mydriatics (atropine, homatropine, scopolamine, cyclopentolate, tropicamide). Gastrointestinal anticholinergics are used to decrease motility (smooth muscle tone) in the GI, biliary, and urinary tracts and for their ability to decrease gastric secretions (propantheline, glycopyrrolate).

CONTRAINDICATIONS: Persons with closed-angle glaucoma, myasthenia gravis, or GI/GU obstruction should not use some of these products.

Precautions: Anticholinergics should be used with caution in patients who are geriatric, pregnant, or breastfeeding or in those with prostatic hypertrophy, congestive heart failure, or hypertension; use with caution in presence of high environmental temperature.

Administer:
- Parenteral dose with patient recumbent to prevent postural hypotension
- With or after meals to prevent GI upset; may give with fluids other than water
- Parenteral dose slowly; keep in bed for at least 1 hr after dose; monitor vital signs
- After checking dose carefully; even slight overdose can lead to toxicity

SIDE EFFECTS: The most common side effects are dry mouth, constipation, urinary retention, urinary hesitancy, headache, and dizziness. Also common is paralytic ileus.

PHARMACOKINETICS: Onset, peak, and duration vary widely among products. Most products are metabolized in the liver and excreted in urine.

INTERACTIONS: Increased anticholinergic effects may occur when used with MAOIs and tricyclics and amantadine. Anticholinergics may cause a decreased effect of phenothiazines and levodopa.

POSSIBLE NURSING DIAGNOSES:
- Decreased cardiac output *[uses]*
- Constipation *[adverse reactions]*
- Deficient knowledge *[teaching]*

NURSING CONSIDERATIONS

Assess:

- I&O ratio; retention commonly causes decreased urinary output
- Urinary hesitancy, retention; palpate bladder if retention occurs
- Constipation; increase fluids, bulk, exercise if this occurs
- For tolerance over long-term therapy, dose may need to be increased or changed
- Mental status: affect, mood, CNS depression, worsening of mental symptoms during early therapy

Perform/provide:

- Storage at room temperature
- Hard candy, frequent drinks, sugarless gum to relieve dry mouth

Evaluate:

- Therapeutic response: decreased secretions, absence of nausea and vomiting

Teach patient/family:

- To avoid driving or other hazardous activities; drowsiness may occur
- To avoid OTC medication: cough, cold preparations with alcohol, antihistamines unless directed by prescriber

SELECTED GENERIC NAMES

atropine
benztropine
glycopyrrolate
hyoscyamine
scopolamine (transdermal)
solifenacin

ANTICOAGULANTS

ACTION: Anticoagulants interfere with blood clotting by preventing clot formation.

USES: Anticoagulants are used for deep venous thrombosis, PE, MI, open-heart surgery, disseminated intravascular clotting syndrome; atrial fibrillation with embolization, transfusion, and dialysis.

CONTRAINDICATIONS: Persons with hemophilia and related disorders, leukemia with bleeding, peptic ulcer disease, thrombocytopenic purpura, blood dyscrasias, acute nephritis, and subacute bacterial endocarditis should not use these products.

Precautions: Anticoagulants should be used with caution in alcoholism, geriatric patients, and pregnancy.

Administer:

- At same time each day to maintain steady blood levels
- In abdomen between pelvic bone, rotate sites; do not massage area or aspirate when giving SUBCUT injection; do not pull back on plunger, leave in for 10 sec, apply gentle pressure for 1 min
- Without changing needles
- Avoiding all IM inj that may cause bleeding

SIDE EFFECTS: The most serious adverse reactions are hemorrhage, agranulocytosis, leukopenia, eosinophilia, and thrombocytopenia, depending on the specific product. The most common side effects are diarrhea, rash, and fever.

PHARMACOKINETICS: Onset, peak, and duration vary widely among products. Most products are metabolized in the liver and excreted in urine.

INTERACTIONS: Salicylates, corticosteroids, and nonsteroidal antiinflammatories will potentiate the action of anticoagulants. Anticoagulants may cause serious effects; check individual monographs.

POSSIBLE NURSING DIAGNOSES:

- Risk for injury *[side effects]*
- Deficient knowledge *[teaching]*
- Ineffective cardiac tissue perfusion *[uses]*

NURSING CONSIDERATIONS

Assess:

- Blood studies (Hct, platelets, occult blood in stools) q3mo
- Partial PT, which should be 1½-2 × control PPT daily, also APTT, ACT
- B/P; watch for increasing signs of hypertension
- Bleeding gums, petechiae, ecchymosis; black, tarry stools; hematuria
- Fever, skin rash, urticaria
- Needed dosage change q1-2wk

Perform/provide:

- Storage in tight container

Evaluate:

- Therapeutic response: decrease of DVT

Teach patient/family:

- To avoid OTC preparations that may cause serious product interactions unless directed by prescriber
- That product may be held during active bleeding (menstruation), depending on condition
- To use soft-bristle toothbrush to avoid bleeding gums; to avoid contact sports, use electric razor
- To carry emergency ID identifying product taken
- To report any signs of bleeding: gums, under skin, urine, stools

SELECTED GENERIC NAMES

argatroban
dabigatran
desirudin
enoxaparin
fondaparinux
heparin
lepirudin
tinzaparin
warfarin

ANTICONVULSANTS

ACTION: Anticonvulsants are divided into the barbiturates, benzodiazepines, hydantoins, succinimides, and miscellaneous products. Barbiturates and benzodiazepines are discussed in separate sections. Hydantoins act by inhibiting the spread of seizure activity in the motor cortex. Succinimides act by inhibiting spike and wave formation; they also decrease amplitude, frequency, duration, and spread of discharge in seizures.

USES: Hydantoins are used in generalized tonic-clonic seizures, status epilepticus, and psychomotor seizures. Succinimides are used for absence (petit mal) seizures. Barbiturates are used in generalized tonic-clonic and cortical focal seizures.

CONTRAINDICATIONS: Hypersensitive reactions may occur, and allergies should be identified before these products are given.

Precautions: Persons with renal/hepatic disease should be watched closely.

Administer:

- With food, milk to decrease GI symptoms

SIDE EFFECTS: Bone marrow depression is the most life-threatening adverse reaction associated with hydantoins or succinimides. The most common side effects are GI symptoms. Other common side effects for hydantoins are gingival hyperplasia and CNS effects such as nystagmus, ataxia, slurred speech, and mental confusion.

PHARMACOKINETICS: Onset, peak, and duration vary widely among products. Most products are metabolized in the liver and excreted in urine, bile, and feces.

INTERACTIONS: Decreased effects of estrogens, oral contraceptives (hydantoins).

POSSIBLE NURSING DIAGNOSES:

- Injury, risk for *[uses]*
- Noncompliance *[teaching]*

NURSING CONSIDERATIONS

Assess:

- Renal studies, including BUN, creatinine, serum uric acid, urine creatinine clearance before and during therapy
- Blood studies: RBC, Hct, Hgb, reticulocyte counts weekly for 4 wk then monthly
- Hepatic studies: AST, ALT, bilirubin, creatinine
- Mental status, including mood, sensorium, affect, behavorial changes; if mental status changes, notify prescriber
- Eye problems, including need for ophthalmic exam before, during, and after treatment (slit lamp, funduscopy, tonometry)
- Allergic reactions, including red, raised rash; if this occurs, product should be discontinued
- Blood dyscrasia, including fever, sore throat, bruising, rash, jaundice
- Toxicity, including bone marrow depression, nausea, vomiting, ataxia, diplopia, CV collapse, Stevens-Johnson syndrome

Perform/provide:

- Good oral hygiene as it is important for hydantoins

Evaluate:

- Therapeutic response: decreased seizure activity; document on patient's chart

Teach patient/family:

- To carry emergency ID stating products taken, condition, prescriber's name, phone number
- To avoid driving, other activities that require alertness

SELECTED GENERIC NAMES

Barbiturates
PHENobarbital
primidone
thiopental
Hydantoins
fosphenytoin
phenytoin
Miscellaneous
acetaZOLAMIDE
carBAMazepine
clonazePAM
diazepam
ezogabine
felbamate
gabapentin
lacosamide
lamoTRIgine
magnesium sulfate
rufinamide
tiaGABine
topiramate
valproate/valproic acid, divalproex sodium
vigabatrin
zonisamide

ANTIDEPRESSANTS

ACTION: Antidepressants are divided into the tricyclics, MAOIs, and miscellaneous antidepressants (SSRIs). The tricyclics work by blocking reuptake of norepinephrine and serotonin into nerve endings and increasing action of norepinephrine and serotonin in nerve cells. MAOIs act by increasing concentrations of endogenous EPINEPHrine, norepinephrine, serotonin, and DOPamine in storage sites in CNS by inhibition of MAO; increased concentration reduces depression.

USES: Antidepressants are used for depression and, in some cases, enuresis in children.

CONTRAINDICATIONS: The contraindications to antidepressants are seizure disorders, prostatic hypertrophy

and severe renal/hepatic/cardiac disease depending on the type of medication.

Precautions: Antidepressants should be used cautiously in suicidal patients, severe depression, schizophrenia, hyperactivity, diabetes mellitus, pregnancy, and geriatric patients.

Administer:

- Increased fluids if urinary retention occurs, bulk in diet, if constipation occurs
- With food or milk for GI symptoms

SIDE EFFECTS: The most serious adverse reactions are paralytic ileus, acute renal failure, hypertension, and hypertensive crisis, depending on the specific product. Common side effects are dizziness, drowsiness, diarrhea, dry mouth, urinary retention, and orthostatic hypotension.

PHARMACOKINETICS: Onset, peak, and duration vary widely among products. Most products are metabolized in the liver and excreted in urine.

INTERACTIONS: Interactions vary widely among products. Check individual monographs for specific information.

POSSIBLE NURSING DIAGNOSES:

- Ineffective coping *[uses]*
- Risk for injury *[uses/adverse reactions]*
- Deficient knowledge *[teaching]*

NURSING CONSIDERATIONS

Assess:

- B/P (lying, standing), pulse q4hr; if systolic B/P drops 20 mm Hg, hold product, notify prescriber; take VS q4hr in patients with cardiovascular disease
- Blood studies: CBC, leukocytes, differential, cardiac enzymes if patient is receiving long-term therapy
- Hepatic studies: AST, ALT, bilirubin, creatinine
- Weight every wk; appetite may increase with product
- EPS, primarily in geriatric patients: rigidity, dystonia, akathisia
- Mental status: mood, sensorium, affect, suicidal tendencies, increase in psychiatric symptoms: depression, panic
- Urinary retention, constipation; constipation is more likely to occur in children, geriatric patients
- Withdrawal symptoms: headache, nausea, vomiting, muscle pain, weakness; do not usually occur unless product was discontinued abruptly
- Alcohol consumption; if alcohol is consumed, hold dose until morning

Perform/provide:

- Storage in tight container at room temperature; do not freeze
- Assistance with ambulation during beginning therapy because drowsiness, dizziness occur
- Safety measures including side rails primarily in geriatric patients
- Checking to see PO medication swallowed
- Gum, hard candy, or frequent sips of water for dry mouth

Evaluate:

- Therapeutic response: decreased depression

Teach patient/family:

- That therapeutic effects may take 2-3 wk
- To use caution in driving, other activities requiring alertness because of drowsiness, dizziness, blurred vision
- To avoid alcohol ingestion, other CNS depressants
- Not to discontinue medication quickly after long-term use; may cause nausea, headache, malaise
- To wear sunscreen or wide-brimmed hat; photosensitivity may occur

SELECTED GENERIC NAMES

Tetracyclics
mirtazapine
Tricyclics
amitriptyline
clomiPRAMINE
desipramine
doxepin
imipramine
nortriptyline
Miscellaneous
buPROPion
DULoxetine
traZODone
venlafaxine
SSRIs
citalopram
escitalopram
FLUoxetine
fluvoxaMINE
PARoxetine
sertraline

ANTIDIABETICS

ACTION: Antidiabetics are divided into the insulins that decrease blood glucose, phosphate, and potassium and increase blood pyruvate and lactate; and oral antidiabetics that cause functioning β-cells in the pancreas to release insulin and improve the effect of endogenous and exogenous insulin.

USES: Insulins are used for ketoacidosis and diabetes mellitus types 1 and 2; oral antidiabetics are used for stable adult-onset diabetes mellitus type 2.

CONTRAINDICATIONS: Hypersensitive reactions may occur, and allergies should be identified before these products are given. Oral antidiabetics should not be used in juvenile or brittle diabetes, diabetic ketoacidosis, or severe renal/hepatic disease.

Precautions: Oral antidiabetics should be used with caution in the geriatric patient, in cardiac disease, pregnancy, breastfeeding, and in the presence of alcohol.

Administer:

- Insulin after warming to room temperature by rotating in palms to prevent lipodystrophy from injecting cold insulin
- Human insulin to those allergic to beef or pork
- Oral antidiabetic 30 min before meals

SIDE EFFECTS: The most common side effect of insulin and oral antidiabetics is hypoglycemia. Other adverse reactions to oral antidiabetics include blood dyscrasias; hepatotoxicity; and, rarely, cholestatic jaundice. Adverse reactions to insulin products include allergic responses and, more rarely, anaphylaxis.

PHARMACOKINETICS: Onset, peak, and duration vary widely among products. Oral antidiabetics are metabolized in the liver, with metabolites excreted in urine, bile, and feces.

INTERACTIONS: Interactions vary widely among products. Check individual monographs for specific information.

POSSIBLE NURSING DIAGNOSES:

- Imbalanced nutrition: more than body requirements *[uses]*

NURSING CONSIDERATIONS

Assess:

- Blood, urine glucose levels during treatment to determine diabetes control (oral products)
- Fasting blood glucose, 2 hr PP (60-100 mg/dl normal fasting level) (70-130 mg/dl normal 2-hr level)
- Hypoglycemic reaction that can occur during peak time

Perform/provide:

- Rotation of inj sites when giving insulin; use abdomen, upper back, thighs, upper arm, buttocks; rotate sites within

one of these regions; keep a record of sites

Evaluate:

- Therapeutic response: decrease in polyuria, polydipsia, polyphagia, clear sensorium; absence of dizziness; stable gait

Teach patient/family:

- To avoid alcohol and salicylates except on advice of prescriber
- Symptoms of ketoacidosis: nausea, thirst, polyuria, dry mouth, decreased B/P; dry, flushed skin; acetone breath, drowsiness, Kussmaul respiration
- Symptoms of hypoglycemia: headache, tremors, fatigue, weakness; that candy or sugar should be carried to treat hypoglycemia
- To test urine for glucose/ketones tid if this product is replacing insulin
- To continue weight control, dietary restrictions, exercise, hygiene
- To obtain yearly eye exams

SELECTED GENERIC NAMES

glipiZIDE
glyBURIDE
insulin aspart
insulin detemir
insulin glargine
insulin glulisine
insulin lispro
insulin, regular
insulin, regular concentrated
linagliptin
liraglutide
metformin
miglitol
pioglitazone
repaglinide
rosiglitazone
saxagliptan
sitaGLIPtin

ANTIDIARRHEALS

ACTION: Antidiarrheals work by various actions, including direct action on intestinal muscles to decrease GI peristalsis; by inhibiting prostaglandin synthesis responsible for GI hypermotility; by acting on mucosal receptors responsible for peristalsis; or by decreasing water content of stools.

USES: Antidiarrheals are used for diarrhea of undetermined causes.

CONTRAINDICATIONS: Persons with severe ulcerative colitis, pseudomembranous colitis with some products.
Precautions: Antidiarrheals should be used with caution in the geriatric patient, pregnancy, breastfeeding, children, dehydration.

Administer:

- For 48 hr only

SIDE EFFECTS: The most serious adverse reactions of some products are paralytic ileus, toxic megacolon, and angioneurotic edema. The most common side effects are constipation, nausea, dry mouth, and abdominal pain.

PHARMACOKINETICS: Onset, peak, and duration vary widely among products. Most products are metabolized in the liver and excreted in urine.

INTERACTIONS: Interactions vary widely among products. Check individual monographs for specific information.

POSSIBLE NURSING DIAGNOSES:

- Constipation *[adverse reactions]*
- Diarrhea *[uses]*
- Deficient fluid volume *[adverse reactions]*
- Deficient knowledge *[teaching]*

NURSING CONSIDERATIONS

Assess:

- Electrolytes (K, Na, Cl) if on long-term therapy
- Bowel pattern before; for rebound constipation after termination of medication
- Response after 48 hr; if no response, product should be discontinued
- Dehydration in children

Evaluate:

- Therapeutic response: decreased diarrhea

Teach patient/family:

- To avoid OTC products
- Not to exceed recommended dose

SELECTED GENERIC NAMES

bismuth subsalicylate
loperamide

ANTIDYSRHYTHMICS

ACTION: Antidysrhythmics are divided into four classes and miscellaneous antidysrhythmics:

- Class I increases the duration of action potential and effective refractory period and reduces disparity in the refractory period between a normal and infarcted myocardium; further subclasses include Ia, Ib, Ic
- Class II decreases the rate of SA node discharge, increases recovery time, slows conduction through the AV node, and decreases heart rate, which decreases O_2 consumption in the myocardium
- Class III increases the duration of action potential and the effective refractory period
- Class IV inhibits calcium ion influx across the cell membrane during cardiac depolarization; decreases SA node discharge; decreases conduction velocity through the AV node
- Miscellaneous antidysrhythmics include those such as adenosine, which slows conduction through the AV node, and digoxin, which decreases conduction velocity and prolongs the effective refractory period in the AV node

USES: Antidysrhythmics are used for PVCs, tachycardia, hypertension, atrial fibrillation, angina pectoris.

CONTRAINDICATIONS: Contraindications vary widely among products.
Precautions: Precautions vary widely among products.

SIDE EFFECTS: Side effects and adverse reactions vary widely among products.

PHARMACOKINETICS: Onset, peak, and duration vary widely among products.

INTERACTIONS: Interactions vary widely among products. Check individual monographs for specific information.

POSSIBLE NURSING DIAGNOSES:

- Decreased cardiac output *[uses]*
- Diarrhea *[adverse reactions]*
- Impaired gas exchange *[adverse reactions]*
- Ineffective cardiac tissue perfusion *[uses]*

NURSING CONSIDERATIONS

Assess:

- ECG continuously to determine product effectiveness, premature ventricular contractions, or other dysrhythmias
- IV inf rate to avoid causing nausea, vomiting
- For dehydration or hypovolemia
- B/P continuously for hypotension, hypertension
- I&O ratio
- Serum potassium
- Edema in feet and legs daily

Evaluate:

- Therapeutic response: decrease in B/P in hypertension; decreased B/P, edema, moist crackles in congestive heart failure

Teach patient/family:
- To comply with dosage schedule, even if patient is feeling better
- To report bradycardia, dizziness, confusion, depression, fever

SELECTED GENERIC NAMES

Class I
moricizine
Class Ia
disopyramide
procainamide
quiNIDine
Class Ib
lidocaine
phenytoin
Class Ic
flecainide
propafenone
Class II
acebutolol
esmolol
propranolol
sotalol
Class III
amiodarone
dronedarone
ibutilide
Class IV
verapamil
Miscellaneous
adenosine
atropine
digoxin

ANTIEMETICS

ACTION: The antiemetics are divided into the 5-HT3 receptor antagonists, the phenothiazines, and the miscellaneous products. The 5HT3 receptor antagonists work by blocking serotonin peripherally, centrally, and in the small intestine. The phenothiazines act by blocking the chemoreceptor trigger zone in the brain. The miscellaneous products work by either decreasing motion sickness or delaying gastric emptying.

USES: Antiemetics are used to prevent nausea and vomiting due to cancer chemotherapy, radiotherapy, and surgery (5-HT3 receptor antagonists); some of the miscellaneous products (antihistamines) work by decreasing motion sickness. Most other products are used for many types of nausea and vomiting.

CONTRAINDICATIONS: Persons developing hypersensitive reactions should not use these products.
Precautions: Antiemetics should be used cautiously in pregnancy, breastfeeding, hepatic disease, and some GI disorders.
Administer:
- Prophylactically, before nausea and vomiting occur, in cancer chemotherapy

SIDE EFFECTS: The most common side effects are headache, dizziness, fatigue, and diarrhea.

PHARMACOKINETICS: Onset, peak, and duration vary widely among products. Most products are metabolized by the liver and excreted by the kidneys.

INTERACTIONS: Interactions vary widely among products. Check individual monographs for specific information. Other CNS depressants increase CNS depression.

POSSIBLE NURSING DIAGNOSES:

- Deficient fluid volume *[uses]*
- Risk for injury *[uses, adverse reactions]*
- Deficient knowledge *[teaching]*
- Imbalanced nutrition: less than body requirements *[uses]*

NURSING CONSIDERATIONS

Assess:
- For reason for nausea, vomiting; absence of nausea and vomiting after giving product

• For hypersensitivity reactions: rash, bronchospasm with some products

Perform/provide:

• Storage at room temperature vial/ampules, oral products

Evaluate:

• Therapeutic response: absence or decreasing nausea and vomiting after use

Teach patient/family:

• To avoid hazardous activities if dizziness occurs; ask for assistance if hospitalized

• To rise slowly to prevent orthostatic hypotension

• To teach all aspects of product usage

• Conservative methods to control nausea and vomiting such as sips of water or other fluids and dry crackers

SELECTED GENERIC NAMES

5-HT3 antagonists

dolasetron
granisetron
ondansetron
palonosetron

Phenothiazines

chlorproMAZINE
prochlorperazine
promethazine

Miscellaneous

aprepitant
fosaprepitant
meclizine
metoclopramide
scopolamine
trimethobenzamide

ANTIFUNGALS (SYSTEMIC)

ACTION: Antifungals act by increasing cell membrane permeability in susceptible organisms by binding sterols and decreasing potassium, sodium, and nutrients in the cell.

USES: Antifungals are used for infections of histoplasmosis, blastomycosis, coccidioidomycosis, cryptococcosis, aspergillosis, phycomycosis, candidiasis, sporotrichosis causing severe meningitis, septicemia, and skin infections.

CONTRAINDICATIONS: Persons with severe bone depression or hypersensitivity should not use these products.

Precautions: Antifungals should be used with caution in renal/hepatic disease and pregnancy.

Administer:

• IV using in-line filter (mean pore diameter >1 μm) using distal veins; check for extravasation, necrosis q8hr

• Product only after C&S confirms organism; make sure product is used in life-threatening infections

SIDE EFFECTS: The most serious adverse reactions include renal tubular acidosis, permanent renal impairment, anuria, oliguria, hemorrhagic gastroenteritis, acute hepatic failure, and blood dyscrasias. Some common side effects include hypokalemia, nausea, vomiting, anorexia, headache, fever, and chills.

PHARMACOKINETICS: Onset, peak, and duration vary widely among products. Most products are metabolized in the liver and excreted in urine.

INTERACTIONS: Interactions vary widely among products. Check individual monographs for specific information.

POSSIBLE NURSING DIAGNOSES:

• Risk for infection *[uses]*
• Risk for injury *[adverse reactions]*
• Deficient knowledge *[teaching]*

NURSING CONSIDERATIONS

Assess:

• VS q15-30min during first infusion; note changes in pulse, B/P

• I&O ratio; watch for decreasing urinary output, change in specific gravity; discontinue product to prevent permanent damage to renal tubules

- Blood studies: CBC, K, Na, Ca, Mg q2wk
- Weight weekly; if weight increases over 2 lb/wk, edema is present; renal damage should be considered
- For renal toxicity: increasing BUN, if >40 mg/dl or if serum creatinine >3 mg/dl; product may be discontinued or dosage reduced
- For hepatotoxicity: increasing AST, ALT, alk phos, bilirubin
- For allergic reaction: dermatitis, rash; product should be discontinued, antihistamines (mild reaction) or EPINEPHrine (severe reaction) administered
- For hypokalemia: anorexia, drowsiness, weakness, decreased reflexes, dizziness, increased urinary output, increased thirst, paresthesias
- For ototoxicity: tinnitus (ringing, roaring in ears), vertigo, loss of hearing (rare)

Perform/provide:

- Protection from light during inf, cover with foil
- Symptomatic treatment as ordered for adverse reactions: aspirin, antihistamines, antiemetics, antispasmodics
- Storage protected from moisture and light; diluted sol is stable for 24 hr

Evaluate:

- Therapeutic response: decreased fever, malaise, rash, negative C&S for infecting organism

Teach patient/family:

- That long-term therapy may be needed to clear infection (2 wk-3 mo depending on type of infection)

SELECTED GENERIC NAMES

amphotericin B
anidulafungin
caspofungin
fluconazole
itraconazole
ketoconazole
micafungin
nystatin
posaconazole
voriconazole

ANTIHISTAMINES

ACTION: Antihistamines compete with histamines for H_1-receptor sites. They antagonize in varying degrees most of the pharmacologic effects of histamines.

USES: Antihistamines are used to control the symptoms of allergies, rhinitis, and pruritus.

CONTRAINDICATIONS: Hypersensitivity to H_1-receptor antagonists occurs rarely. Patients with acute asthma and lower respiratory tract disease should not use these products since thick secretions may result. Other contraindications include closed-angle glaucoma, bladder neck obstruction, stenosing peptic ulcer, symptomatic prostatic hypertrophy, newborns, and breastfeeding.

Precautions: Antihistamines must be used cautiously in conjunction with intraocular pressure since they increase intraocular pressure. Caution should also be used in geriatric patients, those with renal/cardiac disease, hypertension, seizure disorders, pregnancy, and those breastfeeding.

Administer:

- With food or milk to decrease GI symptoms; absorption may be decreased slightly
- Whole (sustained-release tabs)

SIDE EFFECTS: Most products cause drowsiness; however, fexofenadine and loratadine produce little, if any, drowsiness. Other common side effects are headache and thickening of bronchial secretions. Serious blood dyscrasias may occur but are rare. Urinary retention, GI effects occur with many of these products.

PHARMACOKINETICS: Onset varies from 20-60 min, with duration lasting 4-24 hr. In general, pharmacokinetics vary widely among products.

INTERACTIONS: Barbiturates, opioids, hypnotics, tricyclics, or alcohol can increase CNS depression when taken with antihistamines.

POSSIBLE NURSING DIAGNOSES:

- Ineffective airway clearance *[uses]*

NURSING CONSIDERATIONS

Assess:

- I&O ratio; be alert for urinary retention, frequency, dysuria; product should be discontinued if these occur
- CBC during long-term therapy since hemolytic anemia, although rare, may occur
- Blood dyscrasias: thrombocytopenia, agranulocytosis (rare)
- Respiratory status: rate, rhythm, increase in bronchial secretions, wheezing, chest tightness
- Cardiac status: palpitations, increased pulse, hypotension

Perform/provide:

- Hard candy, gum; frequent rinsing of mouth for dryness

Evaluate:

- Therapeutic response: absence of allergy symptoms, itching

Teach patient/family:

- To notify prescriber if confusion, sedation, hypotension occur
- To avoid driving, other hazardous activity if drowsiness occurs
- To avoid concurrent use of alcohol, other CNS depressants
- To discontinue a few days before skin testing

SELECTED GENERIC NAMES

brompheniramine
budesonide
cetirizine
chlorpheniramine
cyproheptadine
desloratadine
diphenhydrAMINE
fexofenadine
levocetirizine
loratadine
promethazine

ANTIHYPERTENSIVES

ACTION: Antihypertensives are divided into angiotensin-converting enzyme (ACE) inhibitors, β-adrenergic blockers, calcium channel blockers, centrally acting adrenergics, diuretics, peripherally acting antiadrenergics, and vasodilators. β-Blockers, calcium channel blockers, and diuretics are discussed in separate sections. Angiotensin-converting enzyme inhibitors act by selectively suppressing renin-angiotensin I to angiotensin II; dilation of arterial and venous vessels occurs. Centrally acting adrenergics act by inhibiting the sympathetic vasomotor center in the CNS that reduces impulses in the sympathetic nervous system; B/P, pulse rate, and cardiac output decrease. Peripherally acting antiadrenergics inhibit sympathetic vasoconstriction by inhibiting release of norepinephrine and/or depleting norepinephrine stores in adrenergic nerve endings. Vasodilators act on arteriolar smooth muscle by producing direct relaxation or vasodilation; a reduction in B/P, with concomitant increases in heart rate and cardiac output, occurs.

USES: Antihypertensives are used for hypertension. Some products are used for heart failure not responsive to conventional therapy. Some products are used in hypertensive crisis, angina, and for some cardiac dysrhythmias.

CONTRAINDICATIONS: Hypersensitive reactions may occur, and allergies should be identified before these products are given. Antihypertensives should not be used in children or in patients with heart block.

Precautions: Antihypertensives should be used with caution in geriatric and di-

alysis patients and in the presence of hypovolemia, leukemia, and electrolyte imbalances.

SIDE EFFECTS: The most common side effects are hypotension, bradycardia, tachycardia, headache, nausea, and vomiting. Side effects and adverse reactions may vary widely between classes and specific products.

PHARMACOKINETICS: Onset, peak, and duration vary widely among products. Most products are metabolized in the liver, with metabolites excreted in urine, bile, and feces.

INTERACTIONS: Interactions vary widely among products. Check individual monographs for specific information.

POSSIBLE NURSING DIAGNOSES:

- Decreased cardiac output *[uses]*
- Diarrhea *[adverse reactions]*
- Impaired gas exchange *[adverse reactions]*
- Ineffective cardiac tissue perfusion *[uses]*

NURSING CONSIDERATIONS

Assess:

- Blood studies: neutrophil; decreased platelets occur with many of the products
- Renal studies: protein, BUN, creatinine; watch for increased levels that may indicate nephrotic syndrome; obtain baselines in renal and hepatic function studies before beginning treatment
- Edema in feet and legs daily
- Allergic reaction, including rash, fever, pruritus, urticaria: product should be discontinued if antihistamines fail to help
- Symptoms of congestive heart failure: edema, dyspnea, wet crackles, B/P
- Renal symptoms: polyuria, oliguria, frequency

Perform/provide:

- Supine or Trendelenburg position for severe hypotension

Evaluate:

- Therapeutic response: decrease in B/P in hypotension; decreased B/P, edema, moist crackles in congestive heart failure

Teach patient/family:

- To comply with dosage schedule, even if feeling better
- To rise slowly to sitting or standing position to minimize orthostatic hypotension

SELECTED GENERIC NAMES

Aldosterone receptor antagonist
eplerenone
Angiotensin-converting enzyme inhibitors
benazepril
enalapril
fosinopril
quinapril
ramipril
trandolapril
Angiotensin II receptor blockers
azilsartan
candesartan
eprosartan
irbesartan
losartan
olmesartan
telmisartan
valsartan
Centrally acting adrenergics
cloNIDine
methyldopa
Peripherally acting antiadrenergics
doxazosin
prazosin
terazosin
Vasodilators
ambrisentan
fenoldopam
hydrALAZINE
minoxidil
nitroprusside
Antiadrenergic combined α-/β-blocker
labetalol
Direct renin inhibitors
aliskiren

ANTIINFECTIVES

ACTION: Antiinfectives are divided into several groups, which include but are not limited to penicillins, cephalosporins, aminoglycosides, sulfonamides, tetracyclines, monobactam, erythromycins, and quinolones. These products act by inhibiting the growth and replication of susceptible bacterial organisms.

USES: Antiinfectives are used for infections of susceptible organisms. These products are effective against bacterial, rickettsial, and spirochetal infections.

CONTRAINDICATIONS: Hypersensitivity reactions may occur. Allergies should be identified before these products are given. Cross-sensitivity can occur between products of different classes (penicillins and cephalosporins). Many persons allergic to penicillins are also allergic to cephalosporins.

Precautions: Antiinfectives should be used with caution in persons with renal/hepatic disease.

Administer:

- For 10-14 days to ensure organism death, prevention of superinfection
- Product after C&S completed; product may be taken as soon as C&S is drawn

SIDE EFFECTS: The most common side effects are nausea, vomiting, and diarrhea. Adverse reactions include bone marrow depression and anaphylaxis.

PHARMACOKINETICS: Onset, peak, and duration vary widely among products. Most products are metabolized in the liver. Metabolites are excreted in urine, bile, and feces.

INTERACTIONS: Interactions vary widely among products. Check individual monographs for specific information.

POSSIBLE NURSING DIAGNOSES:

- Diarrhea *[adverse reactions]*
- Risk for infection *[uses]*

NURSING CONSIDERATIONS

Assess:

- Nephrotoxicity: increased BUN, creatinine
- Blood studies: AST, ALT, CBC, Hct, bilirubin; test monthly if patient is on long-term therapy
- Bowel pattern daily; if severe diarrhea occurs, product should be discontinued
- Urine output; if decreasing, notify prescriber; may indicate nephrotoxicity
- Allergic reaction: rash, fever, pruritus, urticaria; product should be discontinued
- Bleeding: ecchymosis, bleeding gums, hematuria, stool guaiac daily
- Overgrowth of infection: perineal itching, fever, malaise, redness, pain, swelling, drainage, rash, diarrhea, change in cough, sputum

Evaluate:

- Therapeutic response, including absence of fever, fatigue, malaise, draining wounds

Teach patient/family:

- To comply with dosage schedule, even if feeling better
- To report sore throat, bruising, bleeding, joint pain; may indicate blood dyscrasias (rare)

SELECTED GENERIC NAMES

Aminoglycosides

amikacin
azithromycin
clarithromycin
gentamicin
neomycin
streptomycin
tobramycin

Cephalosporins

cefaclor
cefadroxil
ceFAZolin

cefdinir
cefditoren
cefepime
cefixime
cefotaxime
cefprozil
ceftaroline
ceftibuten
cefuroxime
cephalexin
cephradine

Fluoroquinolones

ciprofloxacin
gemifloxacin
levofloxacin
norfloxacin
ofloxacin

Miscellaneous

adefovir dipivoxil
DAPTOmycin
doripenem
ertapenem
fidaxomicin
meropenem
peginterferon alfa-2a
telavancin
vancomycin

Penicillins

amoxicillin/clavulanate
ampicillin/sulbactam
imipenem/cilastatin
nafcillin
oxacillin
penicillin G benzathine
penicillin G
penicillin G procaine
penicillin V
piperacillin
ticarcillin
ticarcillin/clavulanate

Sulfonamides

sulfaSALAzine

Tetracyclines

doxycycline
minocycline
tetracycline

ANTILIPIDEMICS

ACTION: Antilipidemics are divided into three categories or subclassifications; HMG-CoA reductase inhibitors (statins), bile acid sequestrants, and miscellaneous products. The HMG-CoA reductase inhibitors work by reduction of an enzyme that is responsible for the beginning step in cholesterol production. Bile acid sequestrants work by binding cholesterol in the GI system. The miscellaneous products work by various actions.

USES: Primary hypercholesterolemia in individuals as an adjunct with other lifestyle changes.

CONTRAINDICATIONS: Persons breastfeeding (some products) or those with hypersensitivity to any product or severe hepatic disease should not take these products. Antilipidemics are identified as pregnancy category X on some products.

Precautions: Some products are identified as pregnancy category C.

Administer:

- As directed by health care provider; times will vary with medication used

SIDE EFFECTS: The most common side effects are headache, dizziness, fatigue, insomnia, peripheral edema, dysrhythmias, sinusitis, pharyngitis, abdominal pain, diarrhea, constipation, flatulence, and back pain.

PHARMACOKINETICS: Pharmacokinetics and pharmacodynamics vary with each product.

INTERACTIONS: Interactions vary widely among products. Check individual monographs for specific information.

POSSIBLE NURSING DIAGNOSES:

- Constipation *[adverse reactions]*
- Diarrhea *[adverse reactions]*
- Deficient knowledge *[teaching]*
- Noncompliance *[teaching]*

NURSING CONSIDERATIONS

Assess:

- Obtain a diet and lifestyle history, including exercise, smoking, alcohol, and stress-related activities

Perform/provide:

- Protection from sunlight and heat

Evaluate:

- Therapeutic response: decrease in triglycerides and LDL cholesterol levels

Teach patient/family:

- All aspects of medication use
- To combine medication with lifestyle changes, including low-cholesterol diet, decreasing LDL in diet; avoid smoking, alcohol, and sedentary daily routine

SELECTED GENERIC NAMES

HMG-CoA reductase inhibitors

atorvastatin
fluvastatin
lovastatin
pitavastatin
pravastatin
simvastatin

Bile acid sequestrants

cholestyramine
colesevelam
colestipol

Miscellaneous

ezetimibe
fenofibrate
fenofibric acid
gemfibrozil
niacin
niacinamide

ANTINEOPLASTICS

ACTION: Antineoplastics are divided into alkylating agents, antimetabolites, antibiotic agents, hormonal agents, and miscellaneous agents. Alkylating agents act by cross-linking strands of DNA. Antimetabolites act by inhibiting DNA synthesis. Antibiotic agents act by inhibiting RNA synthesis and by delaying or inhibiting mitosis. Hormones alter the effects of androgens, luteinizing hormone, follicle-stimulating hormone, and estrogen by changing the hormonal environment.

USES: Antineoplastics uses vary widely among products and classes of products. They are used to treat leukemia, Hodgkin's disease, lymphomas, and other tumors throughout the body.

CONTRAINDICATIONS: Hypersensitive reactions may occur, and allergies should be identified before these products are given. Also, persons with severe hepatic/renal disease should not use these products unless the benefits outweigh the risks.

Precautions: Persons with bleeding, severe bone marrow depression, or renal/hepatic disease should be watched closely.

Administer:

- Checking IV site for irritation; phlebitis
- EPINEPHrine for hypersensitivity reaction
- Antibiotics for prophylaxis of infection

SIDE EFFECTS: Most products cause thrombocytopenia, leukopenia, and anemia. If these reactions occur, the product may have to be stopped until the problem is corrected. Other side effects include nausea, vomiting, glossitis, and hair loss. Some products also cause hepatotoxicity, nephrotoxicity, and cardiotoxicity.

PHARMACOKINETICS: Onset, peak, and duration vary widely among

products. Most products cross the placenta and are excreted in breast milk and in urine.

INTERACTIONS: Toxicity may occur when used with other antineoplastics or radiation.

POSSIBLE NURSING DIAGNOSES:

- Risk for infection *[adverse reactions]*
- Imbalanced nutrition: less than body requirements *[adverse reactions]*
- Impaired oral mucous membrane *[adverse reactions]*

NURSING CONSIDERATIONS

Assess:

- CBC, differential, platelet count weekly; withhold product if WBC is $<4000/mm^3$ or platelet count is $<75,000/mm^3$; notify prescriber of results
- Renal function studies: BUN, creatinine, serum uric acid, and urine CCr before and during therapy
- I&O ratio; report fall in urine output of 30 ml/hr
- Monitor temp q4hr (may indicate beginning infection)
- LFTs before and during therapy (bilirubin, AST, ALT, LDH), monthly, or as needed
- Bleeding, including hematuria, guaiac, bruising or petechiae, mucosa, or orifices q8hr; obtain prescription for viscous Xylocaine (lidocaine)
- Yellowing of skin, sclera, dark urine, clay-colored stools, itchy skin, abdominal pain, fever, diarrhea
- Edema in feet, joint pain, stomach pain, shaking
- Inflammation of mucosa, breaks in skin

Perform/provide:

- Strict asepsis, protective isolation if WBC levels are low
- Comprehensive oral hygiene, using careful technique and soft-bristle brush

Evaluate:

- Therapeutic response: decreased tumor size

Teach patient/family:

- To report signs of infection, including increased temp, sore throat, malaise
- To report signs of anemia, including fatigue, headache, faintness, SOB, irritability
- To report bleeding; to avoid use of razors or commercial mouthwash

SELECTED GENERIC NAMES

Alkylating agents

bendamustine
busulfan
CARBOplatin
carmustine
chlorambucil
CISplatin
cyclophosphamide
dacarbazine
melphalan
oxaliplatin

Antimetabolites

capecitabine
cytarabine
decitabine
etoposide
fludarabine
fluorouracil
mercaptopurine
methotrexate
PEMEtrexed

Antibiotic agents

bleomycin
DACTINomycin
DAUNOrubicin
DOXOrubicin
epirubicin
mitoMYcin
mitoXANtrone

Hormonal agents

estramustine
flutamide
fulvestrant
goserelin
irinotecan
leuprolide

megestrol
nilutamide
tamoxifen
topotecan

Miscellaneous

alemtuzumab
anastrozole
asparaginase
azaCITIdine
bortezomib
brentuximab
cabazitaxel
cetuximab
crizotinib
dasatinib
eribulin
erlotinib
gemcitabine
ibritumomab
imatinib
interferon alfa-2a
interferon alfa-2b
ipilimumab
irinotecan
ixabepilone
lapatinib
nilotinib
panitumumab
procarbazine
ranibizumab
riTUXimab
sipuleucel-T
SUNItinib
vinBLAStine
vinCRIStine
vinorelbine

ANTIPARKINSON AGENTS

ACTION: Antiparkinson agents are divided into cholinergics, DOPamine, and monoamine oxidase type B agonists. Cholinergics work by blocking or competing at central acetylcholine receptors. DOPamine agonists work by decarboxylation to DOPamine or by activation of dopamine receptors. Monoamine oxidase type B inhibitors work by increasing dopamine activity by inhibiting MAO type B activity.

USES: Antiparkinson agents are used alone or in combination for patients with Parkinson's disease.

CONTRAINDICATIONS: Persons with hypersensitivity, closed-angle glaucoma, and undiagnosed skin lesions should not use these products.

Precautions: Antiparkinson agents should be used with caution in pregnancy, breastfeeding, children, renal/cardiac/hepatic disease, and affective disorder.

Administer:

- Product up until NPO before surgery
- Dosage adjustment depending on patient response
- With meals; limit protein taken with drug
- Only after MAOIs have been discontinued for 2 wk

SIDE EFFECTS: Side effects and adverse reactions vary widely among products. The most common side effects include involuntary movements, headache, numbness, insomnia, nightmares, nausea, vomiting, dry mouth, and orthostatic hypotension.

PHARMACOKINETICS: Onset, peak, and duration vary widely among products. Most products are metabolized in the liver and excreted in urine.

INTERACTIONS: Interactions vary widely among products. Check individual monographs for specific information.

POSSIBLE NURSING DIAGNOSES:

- Risk for injury *[uses]*
- Deficient knowledge *[teaching]*
- Impaired physical mobility *[uses]*

NURSING CONSIDERATIONS

Assess:

- B/P, respiration
- Mental status: affect, mood, behavioral

changes, depression, complete suicide assessment

Perform/provide:

- Assistance with ambulation, during beginning therapy
- Testing for diabetes mellitus, acromegaly if on long-term therapy

Evaluate:

- Therapeutic response: decrease in akathisia, increased mood

Teach patient/family:

- To change positions slowly to prevent orthostatic hypotension
- To report side effects: twitching, eye spasm; indicate overdose
- To use product exactly as prescribed; if product is discontinued abruptly, parkinsonian crisis may occur

SELECTED GENERIC NAMES

amantadine
benztropine
bromocriptine
carbidopa-levodopa
pramipexole
rasagiline
selegiline
tolcapone

ANTIPLATELETS

ACTION: The antiplatelets are divided into the platelet aggregation inhibitors, platelet adhesion inhibitors, and the glycoprotein IIb, IIIa inhibitors. The platelet aggregation inhibitors work by action on thrombin; the platelet adhesion inhibitors work by inhibition of phosphodiesterase; and the glycoprotein IIb, IIIa inhibitors work by preventing fibrin from binding to glycoprotein IIb, IIIa receptors.

USES: Antiplatelets are used to prevent MI and stroke; other products are used for coronary syndromes.

CONTRAINDICATIONS: Persons developing hypersensitive reactions should not use these products.

Precautions: Antiplatelets should be used cautiously in pregnancy, breastfeeding, and bleeding disorders.

Administer:

- With heparin or other aspirin (some products)

SIDE EFFECTS: The most common side effects are headache, dizziness, bleeding, and diarrhea.

PHARMACOKINETICS: Onset, peak, and duration vary widely among products. Most products are metabolized by the liver and excreted by the kidneys.

INTERACTIONS: Interactions vary widely among products. Check individual monographs for specific information.

POSSIBLE NURSING DIAGNOSES:

- Risk for injury *[uses, adverse reactions]*
- Deficient knowledge *[teaching]*

NURSING CONSIDERATIONS

Assess:

- Reason for use of these products
- For hypersensitivity reactions with some products
- For bleeding from orifices, in stool, urine
- Blood studies: platelets, Hgb, Hct, PT/APTT, and INR

Perform/provide:

- Storage at room temperature vial/ampules, oral products

Evaluate:

- Therapeutic response: absence of MI, stroke or other coronary syndromes

Teach patient/family:

- To avoid hazardous activities if drowsiness, dizziness occurs; to ask for assistance if hospitalized
- About all aspects of product usage

SELECTED GENERIC NAMES

Platelet aggregation inhibitors
cilostazol
clopidogrel
ticlopidine
Platelet adhesion inhibitors
dipyridamole
Glycoprotein IIb, IIIa inhibitors
eptifibatide
tirofiban

ANTIPSYCHOTICS

ACTION: Antipsychotics/neuroleptics are divided into several subgroups: phenothiazines, thioxanthenes, butyrophenones, dibenzoxazepines, dibenzodiazepines, and indolones and other heterocyclic compounds. Although chemically different, these subgroups share many pharmacologic and clinical properties. All antipsychotics work to block postsynaptic dopamine receptors in the brain that are responsible for psychotic behavior, including hallucinations, delusions, and paranoia.

USES: Antipsychotic behavior is decreased in conditions such as schizophrenia, paranoia, and mania. These agents are also effective for severe anxiety, intractable hiccups, nausea, vomiting, behavioral problems in children, and relaxation before surgery.

CONTRAINDICATIONS: Persons with hepatic damage, severe hypertension or coronary disease, cerebral arteriosclerosis, blood dyscrasias, bone marrow depression, parkinsonism, severe depression, closed-angle glaucoma, children <12 yr, or persons withdrawing from alcohol or barbiturates should not use antipsychotics until these conditions are corrected.

Precautions: Caution must be used when antipsychotics are given to geriatric patients because metabolism is slowed, and adverse reactions can occur rapidly. Hepatic/renal disease may cause poor metabolism and excretion of the product. Seizure threshold is decreased with these products; increases in the dose of anticonvulsants may be required. Persons with diabetes mellitus, prostatic hypertrophy, chronic respiratory disease, and peptic ulcer disease should be monitored closely.

Administer:

- Antiparkinson agent if EPS occur
- Liquid concentrates mixed in glass of juice or cola because taste is unpleasant; avoid contact with skin when preparing liquid concentrate or parenteral medications
- Patient should remain lying down for at least 30 min after IM inj

SIDE EFFECTS: The most common side effects include EPS such as pseudoparkinsonism, akathisia, dystonia, and tardive dyskinesia, which may be controlled by use of antiparkinson agents. Serious adverse reactions such as hypotension, agranulocytosis, cardiac arrest, and laryngospasm have occurred. Other common side effects include dry mouth and photosensitivity.

PHARMACOKINETICS: Onset, peak, and duration vary widely with different products and routes. Products are metabolized by the liver, are excreted in urine as metabolites, are highly bound to plasma proteins, cross the placenta, and enter breast milk. Half-life can be extended over 3 days.

INTERACTIONS: Because other CNS depressants can cause oversedation, these combinations should be used carefully. Anticholinergics may decrease the therapeutic actions of phenothiazines and also cause increased anticholinergic effects.

POSSIBLE NURSING DIAGNOSES:

- Chronic confusion *[uses]*

NURSING CONSIDERATIONS

Assess:

- Bilirubin, CBC, hepatic studies monthly because these products are metabolized in the liver and excreted in urine
- I&O ratio: palpate bladder if low urinary output occurs; urinary retention occurs with many of these products
- Affect, orientation, LOC, reflexes, gait, coordination, sleep pattern disturbances
- Dizziness, faintness, palpitations, tachycardia on rising
- B/P (lying and standing); wide fluctuations between lying and standing B/P may require dosage or product change because orthostatic hypotension is occurring
- EPS, including akathisia, tardive dyskinesia, pseudoparkinsonism

Perform/provide:

- Supervised ambulation until stabilized on medication; do not involve in strenuous exercise program because fainting is possible; patient should not stand still for long periods
- Increased fluids to prevent constipation
- Sips of water, candy, gum for dry mouth

Evaluate:

- Therapeutic response: decrease in excitement, hallucinations, delusions, paranoia; reorganization of thought patterns, speech

Teach patient/family:

- To rise from sitting or lying position gradually; fainting may occur
- To avoid hot tubs, hot showers, or tub baths; hypotension may occur
- To wear a sunscreen or protective clothing to prevent burns
- To take extra precautions during hot weather to stay cool; heat stroke can occur
- To avoid driving, other activities requiring alertness until response to medication is known
- That drowsiness or impaired mental/motor activity is evident the first 2 wk, but tends to decrease over time

SELECTED GENERIC NAMES

Phenothiazines
chlorproMAZINE
fluPHENAZine
prochlorperazine
thioridazine

Butyrophenone
haloperidol

Miscellaneous
ARIPiprazole
asenapine
iloperidone
loxapine
lurasidone
OLANZapine
paliperidone
QUEtiapine
risperiDONE
ziprasidone

ANTIPYRETICS

ACTION: Antipyretics act on the CNS to control fever and also inhibit prostaglandin production.

USES: Antipyretics are used to decrease fever.

CONTRAINDICATIONS: Persons developing hypersensitive reactions should not use these products.

Precautions: Antipyretics should be used cautiously in pregnancy, breastfeeding, hepatic disease, geriatric patients, and those with certain GI disorders.

Administer:

- Around the clock to keep fever reduced

SIDE EFFECTS: The most common side effects are nausea, vomiting, and rash.

PHARMACOKINETICS: Onset, peak, and duration vary widely among products. Most products are metabolized by the liver and excreted by the kidneys.

INTERACTIONS: Interactions vary widely among products. Check individual monographs for specific information.

POSSIBLE NURSING DIAGNOSES:

- Risk for injury *[uses, adverse reactions]*
- Deficient knowledge *[teaching]*

NURSING CONSIDERATIONS

Assess:
- Temperature frequently
- For reason for use and expected outcome
- For hypersensitivity reactions: rash, bronchospasm with some products

Perform/provide:
- Storage at room temperature

Evaluate:
- Therapeutic response: absence or decreasing fever after use

Teach patient/family:
- All aspects of product usage

SELECTED GENERIC NAMES

acetaminophen
aspirin
choline/magnesium salicylates
choline salicylate
ibuprofen
ketoprofen
magnesium salicylate
naproxen
salsalate

ANTIRETROVIRALS

ACTION: Antiretrovirals act by blocking DNA synthesis.

USES: Antiretrovirals are used for HIV infections and chronic hepatitis C to slow the progression of the disease.

CONTRAINDICATIONS: Persons with hypersensitivity should not use these products.

Precautions: Antiretrovirals should be used cautiously in renal/hepatic disease, pregnancy, and breastfeeding. Protease inhibitors should be used cautiously in diabetes.

Administer:
- In equal intervals around the clock

SIDE EFFECTS: The most common side effects are nausea, vomiting, anorexia, headache, and diarrhea. The most serious adverse reactions are nephrotoxicity and blood dyscrasias.

PHARMACOKINETICS: Onset, peak, and duration vary widely among products. Most products are metabolized by the liver and excreted by the kidneys.

INTERACTIONS: Interactions vary widely among products. Check individual monographs for specific information.

POSSIBLE NURSING DIAGNOSES:

- Risk for infection *[uses]*
- Risk for injury *[adverse reactions]*
- Deficient knowledge *[teaching]*
- Noncompliance *[teaching]*

NURSING CONSIDERATIONS

Assess:
- For signs of HIV infection; increased CD4 counts, decreased viral load; signs of chronic hepatitis C
- Patients with compromised renal system; because product is excreted slowly in poor renal system function, toxicity may occur rapidly

Perform/provide:
- Storage at room temperature

Evaluate:
- Therapeutic response: decreased viral load, increased CD4 count, improvement in the symptoms of HIV/AIDS

Teach patient/family:
- To report sore throat, fever, fatigue; may indicate superinfection
- That medication does not cure condition or prevent infecting others but controls symptoms
- That product must be taken around the clock, in equal intervals, to maintain blood levels for duration of therapy
- To notify prescriber of side effects such as bruising, bleeding, fatigue, malaise; may indicate blood dyscrasias

SELECTED GENERIC NAMES

Nonnucleoside reverse transcriptase inhibitors
delavirdine
efavirenz
etravirine
nevirapine

Nucleoside reverse transcriptase inhibitors
abacavir
didanosine
emtricitabine
lamiVUDine
stavudine
tenofovir
zidovudine

Protease inhibitors
amprenavir
atazanavir
boceprevir
fosamprenavir
indinavir
nelfinavir
ritonavir
saquinavir
tipranavir

Fusion inhibitors
enfuvirtide

Miscellaneous
raltegravir

ANTITUBERCULARS

ACTION: Antituberculars act by inhibiting RNA or DNA or by interfering with lipid and protein synthesis, thereby decreasing tubercle bacilli replication.

USES: Antituberculars are used for pulmonary tuberculosis.

CONTRAINDICATIONS: Persons with severe renal disease or hypersensitivity should not use these products.

Precautions: Antituberculars should be used with caution with pregnancy, breastfeeding, and hepatic disease.

Administer:
- For some of these agents: on empty stomach, 1 hr before meals (only for isoniazid and rifampin) or 2 hr after meals
- Antiemetic if vomiting occurs
- After C&S is completed; monthly to detect resistance

SIDE EFFECTS: They vary widely among products. Most products can cause nausea, vomiting, anorexia, and rash. Serious adverse reactions include renal failure, nephrotoxicity, ototoxicity, and hepatic necrosis.

PHARMACOKINETICS: Onset, peak, and duration vary widely among products. Most products are metabolized in the liver and excreted in urine.

INTERACTIONS: Interactions vary widely among products. Check individual monographs for specific information.

POSSIBLE NURSING DIAGNOSES:
- Risk for infection *[uses]*
- Risk for injury *[adverse reactions]*
- Deficient knowledge *[teaching]*
- Noncompliance *[teaching]*

NURSING CONSIDERATIONS

Assess:

- Signs of anemia: Hct, Hgb, fatigue
- Hepatic studies weekly: ALT, AST, bilirubin
- Renal status before, monthly: BUN, creatinine, output, specific gravity, urinalysis
- Hepatic status: decreased appetite, jaundice, dark urine, fatigue

Evaluate:

- Therapeutic response: decreased symptoms of TB, culture negative

Teach patient/family:

- That compliance with dosage schedule and duration is necessary
- That scheduled appointments must be kept; relapse may occur
- To avoid alcohol while taking product
- To report flulike symptoms: excessive fatigue, anorexia, vomiting, sore throat; unusual bleeding, yellowish discoloration of skin/eyes

SELECTED GENERIC NAMES

ethambutol
isoniazid
pyrazinamide
rifabutin
rifampin
streptomycin

ANTITUSSIVES/EXPECTORANTS

ACTION: Antitussives act by suppressing the cough reflex by direct action on the cough center in the medulla. Expectorants act by liquefying and reducing the viscosity of thick, tenacious secretions.

USES: Antitussives/expectorants are used to treat cough occurring in pneumonia, bronchitis, TB, cystic fibrosis, and emphysema; as an adjunct in atelectasis (expectorants); and nonproductive cough (antitussives).

CONTRAINDICATIONS: Some products are contraindicated in hypothyroidism, pregnancy, and breastfeeding.

Precautions: Some products should be used cautiously in asthmatic, geriatric, and debilitated patients.

Administer:

- Decreased dose to geriatric patients; their metabolism may be slowed

SIDE EFFECTS: The most common side effects are drowsiness, dizziness, and nausea.

PHARMACOKINETICS: Onset, peak, and duration vary widely among products. Some products are metabolized in the liver and excreted in urine.

INTERACTIONS: Interactions vary widely among products. Check individual monographs for specific information.

POSSIBLE NURSING DIAGNOSES:

- Ineffective airway clearance *[uses]*
- Deficient knowledge *[teaching]*

NURSING CONSIDERATIONS

Assess:

- Cough: type, frequency, character (including sputum)

Perform/provide:

- Increased fluids to liquefy secretions
- Humidification of patient's room

Evaluate:

- Therapeutic response: absence of cough

Teach patient/family:

- To avoid driving, other hazardous activities until patient is stabilized on this medication
- To avoid smoking, smoke-filled rooms, perfumes, dust, environmental pollutants, cleaners that increase cough

SELECTED GENERIC NAMES

acetylcysteine
benzonatate
codeine
dextromethorphan
diphenhydrAMINE
guaiFENesin
HYDROcodone

ANTIVIRALS

ACTION: Antivirals act by interfering with DNA synthesis that is needed for viral replication.

USES: Antivirals are used for mucocutaneous herpes simplex virus, herpes genitalis (HSV-1, HSV-2), varicella infections, herpes zoster, and herpes simplex encephalitis.

CONTRAINDICATIONS: Persons with hypersensitivity or immunosuppressed individuals should not use these products.

Precautions: Antivirals should be used cautiously in renal/hepatic disease, pregnancy, and breastfeeding.

Administer:

- Increased fluids to 3 L/day to decrease crystalluria when given IV

SIDE EFFECTS: The most common side effects are nausea, vomiting, anorexia, headache, and diarrhea. The most serious adverse reactions are nephrotoxicity and blood dyscrasias.

PHARMACOKINETICS: Onset, peak, and duration vary widely among products. Most products are metabolized by the liver and excreted by the kidneys.

INTERACTIONS: Interactions vary widely among products. Check individual monographs for specific information.

POSSIBLE NURSING DIAGNOSES:

- Risk for infection *[uses]*
- Risk for injury *[adverse reactions]*
- Deficient knowledge *[teaching]*

NURSING CONSIDERATIONS

Assess:

- For signs of infection, anemia
- Patients with a compromised renal system; because product is excreted slowly in poor renal system function, toxicity may occur rapidly
- Renal studies: urinalysis, BUN, serum creatinine or decreased CCr may indicate nephrotoxicity; I&O ratio; report hematuria, oliguria, fatigue, weakness; check for protein in the urine during treatment
- C&S before treatment, agent may be taken as soon as culture is taken; repeat C&S after treatment
- Bowel pattern before, during treatment; if severe abdominal pain with bleeding occurs, agent should be discontinued
- Skin reactions: rash, urticaria, itching
- Hepatic studies: AST, ALT
- Blood studies: WBC, RBC, Hct, Hgb, bleeding time; blood dyscrasias

Perform/provide:

- Storage at room temperature for up to 12 hr after reconstitution

Evaluate:

- Therapeutic response: absence or control of infection

Teach patient/family:

- To report sore throat, fever, fatigue; may indicate superinfection
- That medication does not prevent infecting others or cure condition but controls symptoms
- That product must be taken around the clock in equal intervals to maintain blood levels for duration of therapy
- To notify prescriber of side effects such as bruising, bleeding, fatigue, malaise; may indicate blood dyscrasias

SELECTED GENERIC NAMES

acyclovir
amantadine
cidofovir
docosanol
entecavir
famciclovir
foscarnet
ganciclovir
lamiVUDine
maraviroc
oseltamivir
penciclovir
valacyclovir
valganciclovir
zanamivir

β-ADRENERGIC BLOCKERS

ACTION: β-Blockers are divided into selective and nonselective blockers. Selective β-blockers competitively block stimulation of β_1-receptors in cardiac smooth muscle; these products produce chronotropic and inotropic effects. Nonselective blockers produce a fall in blood pressure without reflex tachycardia or reduction in heart rate through a mixture of β-blocking effects; elevated plasma renins are reduced.

USES: β-Blockers are used for hypertension, ventricular dysrhythmias, and prophylaxis of angina pectoris.

CONTRAINDICATIONS: Hypersensitive reactions may occur, and allergies should be identified before these products are given. β-Adrenergic blockers should not be used in heart block, congestive heart failure, or cardiogenic shock.

Precautions: β-Blockers should be used with caution in geriatric patients, or in renal/thyroid disease, COPD, coronary artery disease, diabetes mellitus, pregnancy, and asthma.

Administer:

- PO before meals and at bedtime; tabs may be crushed or swallowed whole
- Reduced dosage in renal dysfunction

SIDE EFFECTS: The most common side effects are orthostatic hypotension, bradycardia, diarrhea, nausea, and vomiting. Serious adverse reactions include blood dyscrasias, bronchospasm, and congestive heart failure.

PHARMACOKINETICS: Onset, peak, and duration vary widely among products. Most products are metabolized in the liver, with metabolites excreted in urine, bile, and feces.

INTERACTIONS: Interactions vary widely among products. Check individual monographs for specific information.

POSSIBLE NURSING DIAGNOSES:

- Decreased cardiac output *[uses]*
- Diarrhea *[adverse reactions]*
- Impaired gas exchange *[adverse reactions]*
- Ineffective cardiac tissue perfusion *[uses]*

NURSING CONSIDERATIONS

Assess:

- Renal studies: protein, BUN, creatinine; watch for increased levels that may indicate nephrotic syndrome; obtain baselines in renal/hepatic function studies before beginning treatment
- I&O, weight daily
- B/P during beginning treatment and periodically thereafter; pulse q4hr, note rate, rhythm, quality
- Apical/radial pulse before administration; notify prescriber of significant changes
- Edema in feet and legs daily

Evaluate:

- Therapeutic response: decrease in B/P in hypertension; decreased B/P, edema, moist crackles in congestive heart failure

Teach patient/family:
- To comply with dosage schedule even if feeling better
- To rise slowly to sitting or standing position to minimize orthostatic hypotension
- To report bradycardia, dizziness, confusion, depression, and fever
- To take pulse at home; advise when to notify prescriber
- To comply with weight control, dietary adjustment, modified exercise program
- To wear support hose to minimize effects of orthostatic hypotension
- Not to discontinue product abruptly; taper over 2 wk; may precipitate angina

SELECTED GENERIC NAMES

Selective β_1-receptor blockers
acebutolol
atenolol
esmolol
metoprolol
nebibolol
β2-receptor blockers
indacaterol
Combined α_1-, β_1-, and β_2-receptor blocker
labetalol
Nonselective β_1- and β_2-blockers
carteolol
nadolol
propranolol
timolol

BONE RESORPTION INHIBITORS

ACTION: Bone resorption inhibitors are divided into biphosphonates and selective estrogen receptor modulators. Biphosphonates act by absorbing calcium phosphate crystals in bone and may directly block dissolution of hydroxyapatite crystals of bone, inhibiting normal and abnormal bone resorption and mineralization. Selective estrogen receptor modulators act by reducing resorption of bone and decreasing bone turnover; medicated through estrogen receptor binding.

USES: Bone resorption inhibitors are used for prevention and treatment of osteoporosis in postmenopausal women, treatment of Paget's disease, and treatment of osteoporosis in men.

CONTRAINDICATIONS: Persons developing hypersensitive reactions or those with hypocalcemia should not use these products.
Precautions: Bone resorption inhibitors should be used cautiously in pregnancy, breastfeeding, hepatic/renal disease, geriatric patients, and some GI disorders.
Administer:
- For 6 months or more in Paget's disease

SIDE EFFECTS: The most common side effects are nausea, vomiting, headache, bone pain, and rash.

PHARMACOKINETICS: Onset, peak, and duration vary widely among products. Most products are taken up by the bones and excreted by the kidneys.

INTERACTIONS: Interactions vary widely among products. Check individual monographs for specific information.

POSSIBLE NURSING DIAGNOSES:
- Risk for injury *[uses, adverse reactions]*
- Deficient knowledge *[teaching]*

NURSING CONSIDERATIONS

Assess:
- For reason for use and expected outcome
- For bone density test; hormonal status (women) before starting treatment and thereafter
- For hypercalcemia: paresthesia, twitching, laryngospasm; Chvostek's, Trousseau's signs

Perform/provide:
• Storage at room temperature
Evaluate:
• Therapeutic response: increase in bone mass, absence of fractures
Teach patient/family:
• To remain upright for at least 30 min after taking, to prevent esophageal irritation
• To teach all aspects of product usage
• To use weight-bearing exercise to increase bone density

SELECTED GENERIC NAMES

Bisphosphonates
alendronate
etidronate
ibandronate
pamidronate
risedronate
Selective estrogen receptor modulators
raloxifene
Monoclonal antibody
denosumab

CALCIUM CHANNEL BLOCKERS

ACTION: Calcium channel blockers act by inhibiting calcium ion influx across the cell membrane in cardiac and vascular smooth muscle. This action produces relaxation of coronary vascular smooth muscle, dilates coronary arteries, slows SA/AV node conduction, and dilates peripheral arteries.

USES: Calcium channel blockers are used for chronic stable angina pectoris, vasospastic angina, dysrhythmias, hypertension, and unstable angina.

CONTRAINDICATIONS: Persons with 2nd-/3rd-degree heart block, sick sinus syndrome, hypotension of <90 mm Hg systolic, Wolff-Parkinson-White syndrome, or cardiogenic shock should not use these products; worsening of those conditions may occur.

Precautions: Congestive heart failure because edema may be increased. Hypotension may worsen because B/P is decreased. Patients with renal/hepatic disease should use these products cautiously because they are metabolized in the liver and excreted by the kidneys.
Administer:
• PO before meals and at bedtime

SIDE EFFECTS: The most common side effects are dysrhythmias and edema. Also common are headache, fatigue, drowsiness, and flushing.

PHARMACOKINETICS: Onset, peak, and duration vary widely with route of administration. Products are metabolized by the liver and excreted in the urine primarily as metabolites.

INTERACTIONS: Increased levels of digoxin and theophylline may occur when used with these products. Increased effects of β-blockers and antihypertensives may occur with calcium channel blockers.

POSSIBLE NURSING DIAGNOSES:

• Decreased cardiac output *[adverse reactions]*
• Ineffective cardiac tissue perfusion *[uses]*

NURSING CONSIDERATIONS

Assess:
• Cardiac system: B/P, pulse, respirations, ECG intervals (PR, QRS, QT)
Evaluate:
• Therapeutic response: decreased anginal pain; decreased B/P, dysrhythmias
Teach patient/family:
• How to take pulse before taking product; patient should record or graph pulses to identify changes
• To avoid hazardous activities until stabilized on this product because dizziness commonly occurs

• The need for compliance in all areas of medical regimen, including diet, exercise, stress reduction, and product therapy

SELECTED GENERIC NAMES

amLODIPine
clevidipine
diltiazem
felodipine
isradipine
niCARdipine
NIFEdipine
verapamil

CARDIAC GLYCOSIDES

ACTION: Cardiac glycosides act by inhibiting sodium and potassium ATPase and then making more calcium available to activate contracted proteins. Cardiac contractility and cardiac output are increased.

USES: Cardiac glycosides are used for congestive heart failure, atrial fibrillation, atrial flutter, atrial tachycardia, and rapid digitalization in these disorders.

CONTRAINDICATIONS: Hypersensitive reactions may occur, and allergies should be identified before these products are given. Also, persons with ventricular tachycardia, ventricular fibrillation, and carotid sinus syndrome should not use these products.

Precautions: Persons with acute MI and those who have or may develop serum potassium, calcium, or magnesium imbalances should use these products cautiously. Also, geriatric patients and those with AV block, severe respiratory disease, hypothyroidism, or renal/hepatic disease should exercise caution when these products are prescribed.

Administer:

• Potassium supplements if ordered for potassium levels <3 mg/dl

SIDE EFFECTS: The most common side effects are cardiac disturbances, headache, hypotension, and GI symptoms. Also common are blurred vision and yellow-green halos.

PHARMACOKINETICS: Onset, peak, and duration vary widely with the route of administration. Digitoxin is inactivated by the liver, and inactive metabolites are excreted in urine. Digoxin is excreted in urine mainly as the parent product and metabolites.

INTERACTIONS: Toxicity may occur when used with diuretics, succinylcholine, quiNIDine, and thioamines. Increased blood levels may occur with propantheline bromide, spironolactone, quiNIDine, verapamil, aminoglycosides (PO), amiodarone, anticholinergics, and quiNINE. Diuretics may increase toxicity.

POSSIBLE NURSING DIAGNOSES:

• Decreased cardiac output *[adverse reactions]*
• Ineffective cardiac tissue perfusion *[uses]*

NURSING CONSIDERATIONS

Assess:

• Cardiac system: B/P, pulse, respirations, and increased urine output
• Apical pulse for 1 min before giving product; if pulse <60 bpm, take again in 1 hr; if still <60 bpm, notify prescriber
• Electrolytes: K, Na, Cl, Mg; renal function studies, including BUN and creatinine; and blood studies, including AST, ALT, bilirubin
• I&O ratio, daily weights
• Monitor therapeutic product levels

Evaluate:

• Therapeutic response: decreased weight, edema, pulse, respiration; increased urine output

Teach patient/family:

• How to take pulse before taking prod-

uct; patient should record or graph pulse to identify changes
• To avoid hazardous activities until stabilized on this product; dizziness commonly occurs
• About the need for compliance in all areas of medical regimen, including diet, exercise, stress reduction, product therapy

SELECTED GENERIC NAME

digoxin

CHOLINERGICS

ACTION: Cholinergics act by preventing destruction of acetylcholine, which increases concentration at sites where acetylcholine is released. This exaggerates the effects of acetylcholine and facilitates transmission of impulses across the myoneural junction. Cholinergics may also act by stimulating receptors for acetylcholine.

USES: Cholinergics are used for myasthenia gravis, as antagonists of nondepolarizing neuromuscular blockade, postoperative bladder distention and urinary distention, and postoperative ileus.

CONTRAINDICATIONS: Persons with obstruction of the intestine or renal system should not use these products.
Precautions: Caution should be used in patients with bradycardia, hypotension, seizure disorders, bronchial asthma, coronary occlusion, hyperthyroidism, breastfeeding, and in children.
Administer:
• Only with atropine sulfate available for cholinergic crisis
• Only after all other cholinergics have been discontinued
• Increased doses if tolerance occurs
• Larger doses after exercise or fatigue
• On empty stomach for better absorption

SIDE EFFECTS: The most serious adverse reactions are respiratory depression, bronchospasm, constriction, laryngospasm, respiratory arrest, seizures, and paralysis. The most common side effects are nausea, diarrhea, and vomiting.

PHARMACOKINETICS: Onset, peak, and duration vary widely among products. Most products are metabolized in the liver and excreted in urine.

INTERACTIONS: Interactions vary widely among products. Check individual monographs for specific information.

POSSIBLE NURSING DIAGNOSES:

• Deficient knowledge *[teaching]*
• Noncompliance *[teaching]*
• Impaired urinary elimination *[uses]*

NURSING CONSIDERATIONS

Assess:
• VS, respiration q8hr
• I&O ratio; check for urinary retention or incontinence
• Bradycardia, hypotension, bronchospasm, headache, dizziness, seizures, respiratory depression; product should be discontinued if toxicity occurs
Perform/provide:
• Storage at room temperature
Evaluate:
• Therapeutic response: increased muscle strength, hand grasp; improved muscle gait; absence of labored breathing (if severe)
Teach patient/family:
• That product is not a cure; it only relieves symptoms (myasthenia gravis)
• To carry emergency ID specifying myasthenia gravis, products taken

SELECTED GENERIC NAMES

bethanechol
neostigmine
physostigmine
pyridostigmine

CHOLINERGIC BLOCKERS

ACTION: Cholinergic blockers inhibit or block acetylcholine at receptor sites in the autonomic nervous system.

USES: Many cholinergic blockers are used to decrease secretions before surgery, to reverse neuromuscular blockade, and to decrease motility of GI, biliary, urinary tracts. Other products are used for parkinsonian symptoms, including dystonia associated with neuroleptic products.

CONTRAINDICATIONS: Hypersensitivity can occur, and allergies should be identified before administering these products. Persons with GI and GU obstruction should not use these products since constipation and urinary retention may occur. They are also contraindicated in closed-angle glaucoma and myasthenia gravis.

Precautions: Caution must be used when these products are given to geriatric patients since metabolism is slowed. Also, persons with tachycardia or prostatic hypertrophy should use these products with caution.

Administer:

- With food or milk to decrease GI symptoms
- Parenteral dose with patient recumbent to prevent postural hypotension; give parenteral dose slowly, monitoring vital signs

SIDE EFFECTS: The most common side effects are dryness of the mouth and constipation, which can be prevented by frequent rinsing of the mouth and by increasing water and bulk in the diet.

PHARMACOKINETICS: Onset, peak, and duration vary with route.

INTERACTIONS: Increase in anticholinergic effect occurs when used with opioids, barbiturates, antihistamines, MAOIs, phenothiazines, and amantadine.

POSSIBLE NURSING DIAGNOSES:

- Impaired physical mobility *[uses]*
- Chronic pain *[uses]*

NURSING CONSIDERATIONS

Assess:

- I&O ratio; be alert for urinary retention, frequency, dysuria; product should be discontinued if these occur
- Urinary hesitancy, retention; palpate bladder if retention occurs
- Constipation; increase fluids, bulk, exercise
- For tolerance over long-term therapy; dose may have to be increased or changed
- Mental status: affect, mood, CNS depression, worsening of mental symptoms during early therapy

Perform/provide:

- Hard candy, gum, frequent rinsing of mouth for dryness

Evaluate:

- Therapeutic response: absence of cramps and EPS

Teach patient/family:

- To avoid driving, other hazardous activities if drowsiness occurs
- To avoid concurrent use of cough, cold preparations with alcohol, antihistamines unless directed by prescriber
- To use with caution in hot weather because medication may increase susceptibility to heat stroke

SELECTED GENERIC NAMES

atropine
benztropine
glycopyrrolate
scopolamine

CORTICOSTEROIDS

ACTION: Corticosteroids are divided into glucocorticoids and mineralocorticoids. Glucocorticoids decrease inflammation by the suppression of migration of polymorphonuclear leukocytes, fibroblasts, increased capillary permeability, and lysosomal stabilization. They also have varied metabolic effects and modify the body's immune responses to many stimuli. Mineralocorticoids act by increasing resorption of sodium by increasing hydrogen and potassium excretion in the distal tubule.

USES: Glucocorticoids are used to decrease inflammation and for immunosuppression. In addition, some products may be given for allergy, adrenal insufficiency, or cerebral edema. Mineralocorticoids are given for adrenal insufficiency or adrenogenital syndrome.

CONTRAINDICATIONS: Hypersensitivity may occur and should be identified before administering. Because these products mask infection, they should not be used in systemic fungal infections or amebiasis. Mothers taking pharmacologic doses of corticosteroids should not breastfeed.

Precautions: Caution must be used when these products are prescribed for diabetic patients because hyperglycemia may occur. Also, patients with glaucoma, seizure disorders, peptic ulcer, impaired renal function, congestive heart failure, hypertension, ulcerative colitis, or myasthenia gravis should be monitored closely if corticosteroids are given. Use with caution in children, the geriatric patients, and during pregnancy.

Administer:

- With food or milk to decrease GI symptoms
- Take single daily or alternate-day doses in the morning before 9 AM (for replacement therapy)

SIDE EFFECTS: The most common side effects include change in behavior, including insomnia and euphoria; GI irritation, including peptic ulcer; metabolic reactions, including hypokalemia, hyperglycemia, and carbohydrate intolerance; and sodium and fluid retention. Most adverse reactions are dose-dependent.

PHARMACOKINETICS: For oral preparations, the onset of action occurs between 1 and 2 hr, and duration can be up to 2 days, with a half-life of 2-4 days. Pharmacokinetics vary widely among products. These products cross the placenta and appear in breast milk.

INTERACTIONS: Decreased corticosteroid effect may occur with barbiturates, rifampin, and phenytoin; corticosteroid dose may have to be increased. There is a possibility of GI bleeding when used with salicylates and indomethacin. Corticosteroids may reduce salicylate levels. When using with digoxin, glycosides, potassium-depleting diuretics, and amphotericin, serum potassium levels should be monitored.

POSSIBLE NURSING DIAGNOSES:

- Disturbed body image *[adverse reactions]*
- Risk for infection *[adverse reactions]*
- Risk for suicide *[adverse reactions]*

NURSING CONSIDERATIONS

Assess:

- Potassium, blood glucose, urine glucose while on long-term therapy; hypokalemia and hyperglycemia are common
- Weight daily; notify prescriber of weekly gain >5 lb because these products alter fluid and electrolyte balance
- I&O ratio; be alert for decreasing urinary output and increasing edema
- Plasma cortisol levels during long-term therapy (normal level is 138-635 nmol/L SI units when drawn at 8 AM)

• Infection: increased temp, WBC, even after withdrawal of medication; product masks symptoms of infection
• Adrenal insufficiency: nausea, anorexia, fatigue, dizziness, dyspnea, weakness, joint pain
• Potassium depletion: paresthesias, fatigue, nausea, vomiting, depression, polyuria, dysrhythmias, weakness
• Mental status: affect, mood, behavioral changes, aggression; if severe personality changes occur, including depression, product may have to be tapered and then discontinued

Evaluate:
• Therapeutic response: decreased inflammation

Teach patient/family:
• That emergency ID as steroid user should be carried
• Not to discontinue this medication abruptly; adrenal crisis can result
• All aspects of product use, including cushingoid symptoms
• To take with meals or a snack
• To avoid exposure to chickenpox or measles if taking immunosuppressives

SELECTED GENERIC NAMES

Glucocorticoids
beclomethasone
betamethasone
cortisone
dexamethasone
hydrocortisone
methylPREDNISolone
prednisoLONE
predniSONE
triamcinolone

DIURETICS

ACTION: Diuretics are divided into subgroups: thiazides and thiazide-like diuretics, loop diuretics, carbonic anhydrase inhibitors, osmotic diuretics, and potassium-sparing diuretics. Each one of these subgroups has its own mechanism of action. Thiazides and thiazide-like diuretics increase excretion of water and sodium by inhibiting resorption in the early distal tubule. Loop diuretics inhibit resorption of sodium and chloride in the thick ascending limb of the loop of Henle. Carbonic anhydrase inhibitors increase sodium excretion by decreasing sodium-hydrogen ion exchange throughout the renal tubule. Carbonic anhydrase inhibitors also decrease secretion of aqueous humor in the eye and thus decrease intraocular pressure. Osmotic diuretics increase the osmotic pressure of glomerular filtrate, thus decreasing net absorption of sodium. The potassium-sparing diuretics interfere with sodium resorption at the distal tubule, thus decreasing potassium excretion.

USES: B/P is reduced in hypertension; edema is reduced in congestive heart failure; intraocular pressure is decreased in glaucoma.

CONTRAINDICATIONS: Persons with electrolyte imbalances (Na, Cl, K), dehydration, or anuria should not be given these products until the problem is corrected.

Precautions: Caution must be used when diuretics are given to geriatric patients; electrolyte disturbances and dehydration can occur rapidly. Hepatic/renal disease may cause poor metabolism and excretion of the product.

Administer:
• In AM to avoid interference with sleep if using product as a diuretic
• Potassium replacement if potassium is <3 mg/dl

SIDE EFFECTS: Hypokalemia, hyperuricemia, and hyperglycemia occur most frequently with thiazide diuretics. Aplastic anemia, blood dyscrasias, volume depletion, and dehydration may occur when thiazide-like diuretics, loop diuretics, or carbonic anhydrase inhibitors are given. Side effects and adverse reactions vary widely for the miscellaneous products.

PHARMACOKINETICS: Onset, peak, and duration vary widely among the different subgroups of these products.

INTERACTIONS: Cholestyramine and colestipol will decrease the absorption of thiazide diuretics. Concurrent use of thiazides with diazoxide may increase hyperuricemia, hyperglycemia, and antihypertensive effects of thiazides. Ototoxicity may occur when loop diuretics are used with aminoglycosides. Thiazide and loop diuretics may increase therapeutic and toxic effects of lithium.

POSSIBLE NURSING DIAGNOSES:

- Decreased cardiac output *[adverse reactions]*
- Excess fluid volume *[uses]*

NURSING CONSIDERATIONS

Assess:

- Weight, I&O daily to determine fluid loss; check skin turgor for dehydration
- Electrolytes: K, Na, Cl; include BUN, blood glucose, CBC, serum creatinine, blood pH, ABGs, uric acid, Ca; electrolyte imbalances may occur quickly
- B/P (lying and standing); postural hypotension may occur because fluid loss occurs first from intravascular spaces
- Signs of metabolic alkalosis, including drowsiness and restlessness
- Signs of hypokalemia with some products: postural hypotension, malaise, fatigue, tachycardia, leg cramps, weakness

Evaluate:

- Therapeutic response: improvement in edema of feet, legs, sacral area daily if medication is being used in congestive heart failure; improvement in B/P if medication is being used as a diuretic; improvement in intraocular pressure if medication is being used to decrease aqueous humor in the eye

Teach patient/family:

- To take product early in the day (diuretic) to prevent nocturia

SELECTED GENERIC NAMES

Thiazides
chlorothiazide
hydrochlorothiazide
Thiazide-like
chlorthalidone
indapamide
metolazone
Loop
bumetanide
furosemide
torsemide
Carbonic anhydrase inhibitor
acetaZOLAMIDE
Potassium-sparing
aMILoride
spironolactone
Osmotics
mannitol

HISTAMINE H_2 ANTAGONISTS

ACTION: Histamine H_2 antagonists act by inhibiting histamine at the H_2-receptor site in parietal cells, which inhibits gastric acid secretion.

USES: Histamine H_2 antagonists are used for short-term treatment of duodenal and gastric ulcers and maintenance therapy for duodenal ulcer; gastroesophageal reflux disease.

CONTRAINDICATIONS: Persons with hypersensitivity should not use these products.

Precautions: Caution should be used in pregnancy, breastfeeding, child <16 yr, organic brain syndrome, hepatic/renal disease.

Administer:

- With meals for prolonged product effect
- Antacids 1 hr before or 1 hr after cimetidine
- IV slowly; bradycardia may occur; give over 30 min

SIDE EFFECTS: The most serious adverse reactions are agranulocytosis, thrombocytopenia, neutropenia, aplastic anemia, and exfoliative dermatitis. The most common side effects are confusion (not with ranitidine), headache, and diarrhea.

PHARMACOKINETICS: Onset, peak, and duration vary widely among products. Most products are metabolized in the liver and excreted in urine.

INTERACTIONS: Antacids interfere with absorption of histamine H_2 antagonists. Check individual monographs for specific information.

POSSIBLE NURSING DIAGNOSES:

- Risk for injury *[bleeding]*
- Deficient knowledge *[teaching]*
- Chronic pain *[uses]*

NURSING CONSIDERATIONS

Assess:

- Gastric pH (>5 should be maintained)
- I&O ratio, BUN, creatinine

Perform/provide:

- Storage of diluted sol at room temperature for up to 48 hr

Evaluate:

- Therapeutic response: decreased pain in abdomen

Teach patient/family:

- That gynecomastia, impotence may occur but are reversible
- To avoid driving, other hazardous activities until patient is stabilized on this medication
- To avoid black pepper, caffeine, alcohol, harsh spices, extremes in temperature of food
- To avoid OTC preparations: aspirin, cough, cold preparations
- That product must be continued for prescribed time to be effective
- To report bruising, fatigue, malaise; blood dyscrasias may occur

SELECTED GENERIC NAMES

cimetidine
famotidine
ranitidine

IMMUNOSUPPRESSANTS

ACTION: Immunosuppressants act by inhibiting lymphocytes (T).

USES: Most immunosuppressants are used for organ transplants to prevent rejection.

CONTRAINDICATIONS: Products are contraindicated in hypersensitivity.

Precautions: Caution should be used in severe renal/hepatic disease and pregnancy.

Administer:

- For several days before transplant surgery
- With meals for GI upset or product mixed with chocolate milk
- With oral antifungal for *Candida* infections

SIDE EFFECTS: The most serious adverse reactions are albuminuria, hematuria, proteinuria, renal failure, and hepatotoxicity. The most common side effects are overgrowth of oral *Candida*, gum hyperplasia, tremors, and headache. The most serious adverse reactions for azathioprine are hematologic (leukopenia and thrombocytopenia) and GI (nausea and vomiting). There is a risk of secondary infection.

PHARMACOKINETICS: Onset, peak, and duration vary widely among products. Most products are metabolized in the liver and excreted in urine.

INTERACTIONS: Interactions vary widely among products. Check individual monographs for specific information.

POSSIBLE NURSING DIAGNOSES:

- Risk for infection *[adverse reactions]*
- Risk for injury *[uses]*
- Deficient knowledge *[teaching]*

NURSING CONSIDERATIONS

Assess:

- Renal studies: BUN, creatinine at least monthly during treatment, 3 mo after treatment
- Hepatic studies: alk phos, AST (SGOT), ALT (SGPT), bilirubin
- Product blood levels during treatment
- Hepatotoxicity: dark urine, jaundice, itching, light-colored stools; product should be discontinued

Evaluate:

- Therapeutic response: absence of rejection

Teach patient/family:

- To report fever, chills, sore throat, fatigue; serious infections may occur
- To use contraceptive measures during treatment and for 12 wk after ending therapy

SELECTED GENERIC NAMES

azaTHIOprine
basiliximab
cycloSPORINE
everolimus
muromonab-CD3
sirolimus
tacrolimus

LAXATIVES

ACTION: Laxatives are divided into bulk products, lubricants, osmotics, saline laxative stimulants, and stool softeners. Bulk laxatives work by absorbing water and expanding to increase moisture content and bulk in the stool. Lubricants increase water retention in the stool, causing reabsorption of water in the bowel. Osmotics increase distention and promote peristalsis. Saline draws water into the intestinal lumen. Stimulants act by increasing peristalsis by direct effect on the intestine. Stool softeners reduce surface tension of liquids of the bowel.

USES: Laxatives are used as a preparation for bowel and rectal exam, constipation, and stool softener.

CONTRAINDICATIONS: Persons with GI obstruction, perforation, gastric retention, toxic colitis, megacolon, abdominal pain, nausea, vomiting, or fecal impaction should not use these products.

Precautions: Caution should be used in rectal bleeding, large hemorrhoids, and anal excoriation.

Administer:

- Swallow tabs whole; do not break, crush, or chew
- Alone only with water for better absorption; do not take within 1 hr of antacids, milk, or cimetidine

SIDE EFFECTS: The most common side effects are nausea, abdominal cramps, and diarrhea.

PHARMACOKINETICS: Onset, peak, and duration vary among products.

INTERACTIONS: Interactions vary widely among products. Check individual monographs for specific information.

POSSIBLE NURSING DIAGNOSES:

- Constipation *[uses]*
- Diarrhea *[adverse reactions]*
- Deficient knowledge *[teaching]*

NURSING CONSIDERATIONS

Assess:

- Blood, urine electrolytes if product is used often by patient
- I&O ratio to identify fluid loss
- Cause of constipation: identify whether fluids, bulk, or exercise missing from lifestyle

• Cramping, rectal bleeding, nausea, vomiting; if these symptoms occur, product should be discontinued

Evaluate:

• Therapeutic response: decrease in constipation

Teach patient/family:

• Not to use laxatives for long-term therapy; bowel tone will be lost

• That normal bowel movements do not always occur daily

• Not to use in presence of abdominal pain, nausea, vomiting

• To notify prescriber of abdominal pain, nausea, vomiting

• To notify prescriber if constipation is unrelieved or if symptoms of electrolyte imbalance: muscle cramps, pain, weakness, dizziness

SELECTED GENERIC NAMES

Bulk laxatives
methylcellulose
psyllium
Osmotic agents
glycerin
lactulose
Saline laxatives
magnesium salts
Stimulants
bisacodyl
Stool softener
docusate

NEUROMUSCULAR BLOCKING AGENTS

ACTION: Neuromuscular blocking agents are divided into depolarizing and nondepolarizing blockers. They act by inhibiting transmission of nerve impulses by binding with cholinergic receptor sites.

USES: Neuromuscular blocking agents are used to facilitate endotracheal intubation and skeletal muscle relaxation during mechanical ventilation, surgery, or general anesthesia.

CONTRAINDICATIONS: Persons who are hypersensitive should not be given this product.

Precautions: Caution should be used in pregnancy, thyroid disease, collagen disease, cardiac disease, breastfeeding, children <2 yr, electrolyte imbalances, dehydration, neuromuscular disease (myasthenia gravis), and respiratory disease.

Administer:

• Using nerve stimulator by anesthesia provider to determine neuromuscular blockade

• Anticholinesterase to reverse neuromuscular blockade

• IV undiluted over 1-2 min (only by qualified person, usually an anesthesiologist)

SIDE EFFECTS: The most serious adverse reactions are prolonged apnea, bronchospasm, cyanosis, respiratory depression, and malignant hyperthermia. The most common side effects are bradycardia and decreased motility.

PHARMACOKINETICS: Onset, peak, and duration vary widely among products. Most products are metabolized in the liver and excreted in urine.

INTERACTIONS: Aminoglycosides potentiate neuromuscular blockade. Check individual monographs for specific information.

POSSIBLE NURSING DIAGNOSES:

• Risk for injury *[adverse reactions]*
• Deficient knowledge *[teaching]*

NURSING CONSIDERATIONS

Assess:

• For electrolyte imbalances (K, Mg); may lead to increased action of this product

• VS (B/P, pulse, respirations, airway) q15min until fully recovered; rate, depth,

pattern of respirations, strength of hand grip
• I&O ratio; check for urinary retention, frequency, hesitancy
• Recovery: decreased paralysis of face, diaphragm, leg, arm, rest of body
• Allergic reactions: rash, fever, respiratory distress, pruritus; product should be discontinued

Perform/provide:
• Storage in light-resistant container, cool area
• Reassurance if communication is difficult during recovery from neuromuscular blockade

Evaluate:
• Therapeutic response: paralysis of jaw, eyelid, head, neck, rest of body

SELECTED GENERIC NAMES

atracurium
pancuronium
rocuronium
succinylcholine
vecuronium

NONSTEROIDAL ANTIINFLAMMATORIES

ACTION: Nonsteroidal antiinflammatories decrease prostaglandin synthesis by inhibiting an enzyme needed for biosynthesis.

USES: Nonsteroidal antiinflammatories are used to treat mild to moderate pain, osteoarthritis, rheumatoid arthritis, and dysmenorrhea.

CONTRAINDICATIONS: Persons with hypersensitivity, asthma, or severe renal/hepatic disease should not use these products.

Precautions: Caution should be used in pregnancy, breastfeeding, children, geriatric patients, bleeding/GI/cardiac disorders, and hypersensitivity to other antiinflammatory agents.

Administer:
• With food to decrease GI symptoms; however, best to take on empty stomach to facilitate absorption

SIDE EFFECTS: The most serious adverse reactions are nephrotoxicity (dysuria, hematuria, oliguria, azotemia), blood dyscrasias, and cholestatic hepatitis. The most common side effects are nausea, abdominal pain, anorexia, dizziness, and drowsiness.

PHARMACOKINETICS: Onset, peak, and duration vary widely among products. Most products are metabolized in the liver and excreted in urine.

INTERACTIONS: Interactions vary widely among products. Check individual monographs for specific information.

POSSIBLE NURSING DIAGNOSES:

• Deficient knowledge *[teaching]*
• Impaired physical mobility *[uses]*
• Noncompliance *[teaching]*
• Chronic pain *[uses]*

NURSING CONSIDERATIONS

Assess:
• Renal, hepatic, blood studies: BUN, creatinine, AST, ALT, Hgb, before treatment, periodically thereafter
• Audiometric, ophthalmic examination before, during, and after treatment
• For eye, ear problems: blurred vision, tinnitus; may indicate toxicity

Perform/provide:
• Storage at room temperature

Evaluate:
• Therapeutic response: decreased pain, stiffness in joints; decreased swelling in joints; ability to move more easily

Teach patient/family:
• To report blurred vision, ringing, roaring in ears; may indicate toxicity
• To avoid driving, other hazardous activities if dizziness, drowsiness occur, especially in geriatric patients

• To report change in urine pattern, increased weight, edema, increased pain in joints, fever, blood in urine; indicate nephrotoxicity
• That therapeutic effects may take up to 1 mo

SELECTED GENERIC NAMES

celecoxib
diclofenac
ibuprofen
indomethacin
ketoprofen
ketorolac
nabumetone
naproxen
piroxicam
sulindac

OPIOID ANALGESICS

ACTION: Opioid analgesics act by depressing pain impulse transmission at the spinal cord level by interacting with opioid receptors. Products are divided into opiates and nonopiates.

USES: Most opioid analgesics are used to control moderate to severe pain and are used before and after surgery.

CONTRAINDICATIONS: Hypersensitive reactions occur frequently. Check for sensitivity before administering. These products should be used cautiously if opiate addiction is suspected.
Precautions: Caution must be used when these products are given to a person with an addictive personality because the possibility of addiction is so great. Also, they may worsen intracranial pressure. Persons with severe heart disease, hepatic/renal disease, respiratory conditions, or seizure disorders should be monitored closely for worsening condition.
Administer:
• With antiemetic if nausea or vomiting occurs
• When pain is beginning to return; determine dosage interval by response

SIDE EFFECTS: GI symptoms, including nausea, vomiting, anorexia, constipation, and cramps, are the most common side effects. Other common side effects include light-headedness, dizziness, and sedation. Serious adverse reactions such as respiratory depression, respiratory arrest, circulatory depression, and increased intracranial pressure may result but are less common and usually dose dependent.

PHARMACOKINETICS: Onset of action is immediate by IV route and rapid by IM and PO routes. Peak occurs from 1-2 hr, depending on route, with a duration of 2-8 hr. These agents cross the placenta and appear in breast milk.

INTERACTIONS: Barbiturates, other opioids, hypnotics, antipsychotics, or alcohol can increase CNS depression when taken with opioids.

POSSIBLE NURSING DIAGNOSES:

• Impaired gas exchange */adverse reactions/*
• Acute pain */uses/*

NURSING CONSIDERATIONS

Assess:
• I&O ratio; be alert for urinary retention, frequency, and dysuria; product should be discontinued if these occur
• Respiratory dysfunction: respiratory depression, rate, rhythm, character; notify prescriber if respirations are <12/min
• CNS changes: dizziness, drowsiness, hallucinations, euphoria, LOC, pupil reaction
• Allergic reactions: rash, urticaria
• Need for pain medication; use pain scoring

Perform/provide:
- Assistance with ambulation; patient should not be ambulating during product peak

Evaluate:
- Therapeutic response: decrease in pain

Teach patient/family:
- To report any symptoms of CNS changes, allergic reactions, or SOB
- That physical dependency may result when used for extended periods
- That withdrawal symptoms may occur, including nausea, vomiting, cramps, fever, faintness, anorexia
- To avoid alcohol and other CNS depressants

SELECTED GENERIC NAMES

buprenorphine
butorphanol
codeine
fentaNYL
fentaNYL transdermal
HYDROmorphone
meperidine
methadone
morphine
nalbuphine
oxyCODONE
oxymorphone
pentazocine
remifentanil

SALICYLATES

ACTION: Salicylates have analgesic, antipyretic, and antiinflammatory effects. The analgesic and antiinflammatory activities may be mediated through the inhibition of prostaglandin synthesis. Antipyretic action results from inhibition of the hypothalamic heat-regulating center.

USES: The primary uses of salicylates are relief of mild to moderate pain and fever and in inflammatory conditions such as arthritis, thromboembolic disorders, and rheumatic fever.

CONTRAINDICATIONS: Hypersensitivity to salicylates is common. Check for sensitivity before administering. Persons with bleeding disorders, GI bleeding, and vit K deficiency should not use these products; salicylates increase PT. Children should not use these products; salicylates have been associated with Reye's syndrome.

Precautions: Caution is needed when salicylates are given to patients with anemia, hepatic/renal disease, and Hodgkin's disease. Caution should also be exercised in pregnancy and breastfeeding.

Administer:
- With food or milk to decrease gastric irritation; give 30 min before or 1 hr after meals with a full glass of water

SIDE EFFECTS: The most common side effects are GI symptoms and rash. Serious blood dyscrasias and hepatotoxicity may result when used for long periods at high doses. Tinnitus or impaired hearing may indicate that blood salicylate levels are reaching or exceeding the upper limit of the therapeutic range.

PHARMACOKINETICS: Onset of action occurs in 15-30 min, with a peak of 1-2 hr and a duration up to 6 hr. These products are metabolized by the liver and excreted by the kidneys.

INTERACTIONS: Increased effects of anticoagulants, insulin, methotrexate, heparin, valproic acid, and oral sulfonylureas may occur when used with salicylates. Aspirin may decrease serum concentrations of nonsteroidal antiinflammatory agents.

POSSIBLE NURSING DIAGNOSES:

- Activity intolerance *[uses]*
- Impaired physical mobility *[uses]*
- Acute pain *[uses]*
- Chronic pain *[uses]*
- Ineffective thermoregulation *[uses]*

NURSING CONSIDERATIONS

Assess:

- Hepatic/renal studies: AST, ALT, bilirubin, creatinine, LDH, alk phos, BUN if patient is on long-term therapy since these products are metabolized and excreted by the liver and kidneys
- Blood studies: CBC, hematocrit, hemoglobin, and PT if patient is on long-term therapy because these products increase the possibility of bleeding and blood dyscrasias
- Hepatotoxicity: dark urine, clay-colored stools; yellowing of skin, sclera; itching, abdominal pain, fever, diarrhea, which may occur with long-term use
- Ototoxicity: tinnitus; ringing, roaring in ears; audiometric testing is needed before and after long-term therapy

Evaluate:

- Therapeutic response: decreased pain, fever

Teach patient/family:

- That blood glucose levels should be monitored closely if patient is diabetic
- Not to exceed recommended dosage; acute poisoning may result
- That therapeutic response takes 2 wk in arthritis
- To avoid use of alcohol; GI bleeding may result
- To notify prescriber of ringing in the ears or persistent GI pain
- To take with full glass of water to reduce risk of lodging in esophagus

SELECTED GENERIC NAMES

aspirin
choline salicylate
magnesium salicylate
salsalate

SEDATIVES/HYPNOTICS

ACTION: Sedatives/hypnotics depress the CNS; some products at the cerebral cortex, others inhibit transmitters in the CNS.

USES: Sedatives/hypnotics are used for the treatment of sleep disorders, seizures, muscle spasms, and alcohol withdrawal.

CONTRAINDICATIONS: Persons with hypersensitivity reactions should not use these products.

Precautions: Sedatives/hypnotics should be used cautiously in pregnancy (C) and breastfeeding.

Administer:

- Lowest possible dose for therapeutic result; adjust dose to response

SIDE EFFECTS: The most common side effects are nausea and drowsiness. The most serious side effects are Stevens-Johnson syndrome, blood dyscrasias, and risk of dependency.

PHARMACOKINETICS: Onset, peak, and duration vary widely among products. Most products are metabolized in the liver and excreted by the kidneys.

INTERACTIONS: Increased CNS depression may occur with other CNS depressants such as alcohol, opiates, antipsychotics, and antidepressants.

POSSIBLE NURSING DIAGNOSES:

- Deficient knowledge *[teaching]*
- Noncompliance *[teaching]*
- Insomnia *[uses]*

NURSING CONSIDERATIONS

Assess:

- Mental status: affect, mood, behavioral changes, depression, confusion; seizure activity

Perform/provide:

- Assistance with ambulation during beginning therapy if dizziness, ataxia occur

Evaluate:

- Therapeutic response: ability to sleep throughout the night; absence or decreasing seizure activity

Teach patient/family:
- That these products should only be used for short-term insomnia
- Not to drive or engage in other hazardous activities while taking these products
- To avoid breastfeeding while taking these products
- To avoid alcohol or other CNS depressants because drowsiness will increase
- That some of the products take 2 nights to be effective
- To report side effects, adverse reactions to health care provider
- To use exactly as prescribed, at regular intervals

SELECTED GENERIC NAMES

Barbiturates
PHENobarbital
Benzodiazepines
chlordiazePOXIDE
clorazepate
diazepam
flurazepam
LORazepam
midazolam
oxazepam
temazepam
triazolam
Miscellaneous products
chloral hydrate
dexmedetomidine
droperidol
eszopiclone
hydrOXYzine
promethazine
ramelteon
zaleplon
zolpidem

SKELETAL MUSCLE RELAXANTS

ACTION: Most skeletal muscle relaxants inhibit synaptic responses in the CNS by stimulating receptors and decreasing neurotransmission, decreasing pain and spasticity.

USES: Skeletal muscle relaxants are used for musculoskeletal disorders with pain or spasticity related to spinal cord injuries.

CONTRAINDICATIONS: Persons with hypersensitivity should not use these products.
Precautions: Skeletal muscle relaxants should be used cautiously in pregnancy (C), peptic ulcer, renal/hepatic disease, stroke, seizure disorder, diabetes, breastfeeding, and geriatric patients.
Administer:
- When pain is beginning to return, not after pain is severe

SIDE EFFECTS: The most common side effects are dizziness, weakness, fatigue, drowsiness, and headache. Some products can cause seizures, CV collapse, and severe CNS depression.

PHARMACOKINETICS: Pharmacokinetics vary widely among products. Check individual monographs for specific information.

INTERACTIONS: CNS depressants used with skeletal muscle relaxants may lead to increased CNS depression.

POSSIBLE NURSING DIAGNOSES:
- Risk for injury *[adverse reactions]*
- Deficient knowledge *[teaching]*
- Impaired physical mobility *[uses]*
- Acute pain *[uses]*
- Chronic pain *[uses]*

NURSING CONSIDERATIONS

Assess:
- Pain: character, location, duration, alleviating/aggravating factors
Perform/provide:
- Storage in dry area, away from heat and sunlight
Evaluate:
- Therapeutic response: decreased pain or spasticity

Teach patient/family:
- Not to use with other CNS depressant unless prescriber approved
- That many products require 1-2 mo of treatment for full effect
- To avoid hazardous activities until response to medication is known
- That most products should not be discontinued quickly but tapered over 1-2 wk

SELECTED GENERIC NAMES

Centrally acting
baclofen
carisoprodol
cyclobenzaprine
diazepam
methocarbamol
Direct-acting
dantrolene

THROMBOLYTICS

ACTION: Thrombolytics act by activating conversion of plasminogen to plasmin (fibrinolysin). Plasmin is able to break down clots (fibrin).

USES: Thrombolytics are used to treat DVT, pulmonary embolism, arterial thrombosis, arterial embolism, arteriovenous cannula occlusion, lysis of coronary artery thrombi after MI, and acute, evolving transmural MI.

CONTRAINDICATIONS: Persons with hypersensitivity, active bleeding, intraspinal surgery, neoplasms of the CNS, ulcerative colitis/enteritis, severe hypertension, renal/hepatic disease, hypocoagulation, COPD, subacute bacterial endocarditis, rheumatic valvular disease, cerebral embolism/thrombosis/hemorrhage, recent intraarterial diagnostic procedure or surgery (10 days), and recent major surgery should not use these products.

Precautions: Caution should be used in arterial emboli from left side of heart and pregnancy.

Administer:
- As soon as thrombi identified; not useful for thrombi over 1 wk old
- Cryoprecipitate or fresh, frozen plasma if bleeding occurs
- Loading dose at beginning of therapy; may require increased loading doses
- Heparin after fibrinogen level is >100 mg/dl; heparin inf to increase PTT to 1.5-2 × baseline for 3-7 days
- About 10% of patients have high streptococcal antibody titers requiring increased loading doses
- IV therapy using 0.8 μm filter

SIDE EFFECTS: Serious adverse reactions include GI, GU, intracranial retroperitoneal bleeding, and anaphylaxis. The most common side effects are decreased Hct, urticaria, headache, and nausea.

PHARMACOKINETICS: Onset, peak, and duration vary widely among products. Most products are metabolized in the liver and excreted in urine.

INTERACTIONS: Interactions vary widely among products. Check individual monographs for specific information.

POSSIBLE NURSING DIAGNOSES:
- Risk for injury *[uses]*

NURSING CONSIDERATIONS

Assess:
- VS, B/P, pulse, resp, neurologic signs, temp at least q4hr; temp >104° F (40° C) indicator of internal bleeding; cardiac rhythm following intracoronary administration; systolic pressure increase of >25 mm Hg should be reported to prescriber
- For neurologic changes that may indicate intracranial bleeding

• Retroperitoneal bleeding: back pain, leg weakness, diminished pulses
• Allergy: fever, rash, itching, chill; mild reaction may be treated with antihistamines
• For bleeding during 1st hr of treatment: hematuria, hematemesis, bleeding from mucous membranes, epistaxis, ecchymosis
• Blood studies (Hct, platelets, PTT, PT, TT, aPTT) before starting therapy; PT or APTT must be <2× control before starting therapy or PT q3-4hr during treatment

Perform/provide:
• Storage of reconstituted product in refrigerator; discard after 24 hr
• Bed rest during entire course of treatment

Evaluate:
• Therapeutic response: resolution of thrombosis, embolism

Teach patient/family:
• To avoid venous or arterial puncture, inj, rectal temp
• To treat fever with acetaminophen or aspirin
• To apply pressure for 30 sec to minor bleeding sites; to inform prescriber if this does not attain hemostasis; to apply pressure dressing

SELECTED GENERIC NAMES

alteplase
tenecteplase
urokinase

THYROID HORMONES

ACTION: Thyroid hormones act by increasing metabolic rates resulting in increased cardiac output, O_2 consumption, body temp, blood volume, growth, development at cellular level, respiratory rate, and enzyme system activity.

USES: Thyroid hormones are used for thyroid replacement.

CONTRAINDICATIONS: Persons with adrenal insufficiency, MI, or thyrotoxicosis should not use these products.

Precautions: Geriatric patients and those with angina pectoris, hypertension, ischemia, cardiac disease, diabetes mellitus or insipidus should be watched closely when using these products. Caution should be used in pregnancy (A) and breastfeeding.

Administer:
• At same time each day to maintain product level
• Only for hormone imbalances; not to be used for obesity, male infertility, menstrual conditions, lethargy

SIDE EFFECTS: The most common side effects include insomnia, tremors, tachycardia, palpitations, angina, dysrhythmias, weight loss, and changes in appetite. Serious adverse reactions include thyroid storm.

PHARMACOKINETICS: Pharmacokinetics vary widely among products. Check individual monographs for specific information.

INTERACTIONS:
• Impaired absorption of thyroid products may occur when administered with cholestyramine, iron products (separate by 4-5 hr)
• Increased effects of anticoagulants, sympathomimetics, tricyclics, catecholamines may occur
• Decreased effects of digoxin, glycosides, insulin, hypoglycemics may occur
• Decreased effects of thyroid products may occur with estrogens

POSSIBLE NURSING DIAGNOSES:
• Disturbed body image *[adverse reactions]*
• Deficient knowledge *[teaching]*
• Noncompliance *[teaching]*

NURSING CONSIDERATIONS

Assess:

- B/P, pulse before each dose
- I&O ratio
- Weight daily in same clothing, using same scale, at same time of day
- PT should be closely monitored, and dosage of anticoagulant therapy may need adjustment
- Height, growth rate if given to a child
- T_3, T_4, which are decreased; radioimmunoassay of TSH, which is increased; ratio uptake, which is decreased if patient is on too low a dosage of medication
- Increased nervousness, excitability, irritability; may indicate overdosage, usually after 1-3 wk of treatment
- Cardiac status: angina, palpitation, chest pain, change in VS

Perform/provide:

- Removal of medication 4 wk before RAIU test

Evaluate:

- Therapeutic response: absence of depression; increased weight loss; diuresis; pulse; appetite; absence of constipation; peripheral edema; cold intolerance; pale, cool, dry skin; brittle nails; alopecia; coarse hair; menorrhagia; night blindness; paresthesias; syncope; stupor; coma; rosy cheeks

Teach patient/family:

- That hair loss will occur in children and is temporary
- To report excitability, irritability, anxiety, chest pain, palpitations, increased pulse, excessive sweating, heat intolerance; indicates overdose
- Not to switch brands unless directed by prescriber
- That hypothyroid children will show almost immediate behavior/personality change
- That treatment product is not to be taken to reduce weight
- To avoid OTC preparations with iodine; read labels
- To avoid iodine in food: iodinized salt, soybeans, tofu, turnips, some seafood, some bread

SELECTED GENERIC NAMES

levothyroxine (T_4)
liothyronine (T_3)
liotrix
thyroid USP

VASODILATORS

ACTION: Vasodilators have various modes of action. Check individual monographs for specific action.

USES: Vasodilators are used to treat intermittent claudication, arteriosclerosis obliterans, vasospasm and muscular ischemia, ischemic cerebrovascular disease, hypertension, and angina.

CONTRAINDICATIONS: Some products are contraindicated in acute MI, paroxysmal tachycardia, and thyrotoxicosis.

Precautions: Caution should be used in uncompensated heart disease or peptic ulcer disease.

Administer:

- With meals to reduce GI symptoms

SIDE EFFECTS: The most common side effects are headache, nausea, hypotension, hypertension, and ECG changes.

PHARMACOKINETICS: Onset, peak, and duration vary widely among products. Most products are metabolized in the liver and excreted in urine.

INTERACTIONS: Interactions vary widely among products. Check individual monographs for specific information.

POSSIBLE NURSING DIAGNOSES:

- Decreased cardiac output *[uses]*
- Deficient knowledge *[teaching]*
- Ineffective cardiac tissue perfusion *[uses]*

NURSING CONSIDERATIONS

Assess:
- Bleeding time in individuals with bleeding disorders
- Cardiac status: B/P, pulse, rate, rhythm, character; watch for increasing pulse

Perform/provide:
- Storage in tight container at room temperature

Evaluate:
- Therapeutic response: ability to walk without pain, increased temp in extremities, increased pulse volume

Teach patient/family:
- That medication is not a cure; may need to be taken continuously
- That it is necessary to quit smoking to prevent excessive vasoconstriction
- That improvement may be sudden, but usually occurs gradually over several weeks
- To report headache, weakness, increased pulse, as product may have to be decreased or discontinued
- To avoid hazardous activities until stabilized on medication; dizziness may occur

SELECTED GENERIC NAMES

bosentan
dipyridamole
hydrALAZINE
isoxsuprine
minoxidil
nesiritide

VITAMINS

ACTION: The action of vitamins varies widely among products and classes. Check individual monographs for specific information.

USES: Vitamins are used to correct and prevent vitamin deficiencies.

CONTRAINDICATIONS: Hypersensitive reactions may occur, and allergies should be identified before these products are given.

Administer:
- PO with food for better absorption

SIDE EFFECTS: There are no side effects or adverse reactions with the water-soluble vitamins (C, B). However, fat-soluble vitamins (A, D, E, K) may accumulate in the body and cause adverse reactions (see individual monographs).

PHARMACOKINETICS: Onset, peak, and duration vary widely among products. Check individual monographs for specific information.

POSSIBLE NURSING DIAGNOSES:

- Imbalanced nutrition: less than body requirements*[uses]*

NURSING CONSIDERATIONS

Perform/provide:
- Storage in tight, light-resistant container

Evaluate:
- Therapeutic response: no vitamin deficiency

Teach patient/family:
- Not to take more than prescribed amount

SELECTED GENERIC NAMES

Fat-soluble
phytonadione (vitamin K_1)
vitamin A
vitamin D
vitamin E

Water-soluble
ascorbic acid (C)
cyanocobalamin (B_{12})
pyridoxine (B_6)
riboflavin (B_2)
thiamine (B_1)

Miscellaneous
multivitamins

abacavir (Rx)

(ah-bak'ah-veer)

Ziagen

Func. class.: Antiretroviral

Chem. class.: Nucleoside reverse transcriptase inhibitor (NRTI)

Do not confuse:
abacavir/amprenavir

ACTION: Inhibitory action against HIV-1; inhibits replication of the virus by incorporating into cellular DNA by viral reverse transcriptase, thereby terminating the cellular DNA chain

USES: In combination with other antiretroviral agents for HIV-1 infection (not to be used with lamivudine or tenofovir)
Unlabeled uses: HIV prophylaxis following occupational exposure

CONTRAINDICATIONS

Black Box Warning: Hypersensitivity, moderate severe hepatic disease

Precautions: Pregnancy (C), breastfeeding, children <3 mo, granulocyte count <1000/mm^3 or Hgb <9.5 g/dl, severe renal disease, impaired hepatic function, HLA B5701

Black Box Warning: Lactic acidosis

DOSAGE AND ROUTES

• **Adult and adolescent ≥16 yr: PO** 300 mg bid or 600 mg/day with other antiretrovirals

• **Adolescent <16 yr and child ≥3 mo: PO** 8 mg/kg bid, max 300 mg bid with other antiretrovirals

Hepatic dose

• **Adult: PO** (Child-Pugh 5-6) (oral sol) 200 mg bid; severe hepatic disease, do not use

HIV prophylaxis (unlabeled)

• **Adult: PO** 300 mg bid to be added to the basic 2-drug regimen ×4 wk

Available forms: Tabs 300 mg; oral sol 20 mg/ml

Administer:

• Give in combination with other antiretrovirals with or without food; do not use triple therapy as a beginning treatment, resistance may occur

• Reduce dose in hepatic disease, use oral sol

SIDE EFFECTS

CNS: *Fever, headache, malaise, insomnia,* paresthesia

GI: *Nausea, vomiting, diarrhea, anorexia,* cramps, abdominal pain, increased AST, ALT, hepatotoxicity, hepatomegaly with steatosis

HEMA: Granulocytopenia, anemia, lymphopenia

INTEG: *Rash,* urticaria, hypersensitivity reactions

META: Lactic acidosis

OTHER: Fatal hypersensitivity reactions, MI

RESP: Dyspnea

PHARMACOKINETICS

Rapid/extensive absorption, distributed to extravascular space then erythrocytes; 50% plasma protein binding; extensively metabolized to inactive metabolites; half-life 1½ hr; excreted in urine, feces (unchanged)

INTERACTIONS

• Do not coadminister with abacavir-containing products

⚠ Increase: possible lactic acidosis—ribavirin

Increase: abacavir levels—alcohol

Decrease: abacavir levels—tipranavir

Decrease: levels of—methadone

Drug/Lab Test

Increase: glucose, triglycerides, GGT

NURSING CONSIDERATIONS

Assess:

• Symptoms of HIV and possible infections; increased temp

⚠ Lactic acidosis (elevated lactate levels, increased LFTs), severe hepatomegaly with steatosis, discontinue treatment and do not restart; may have large liver,

elevated AST, ALT, lactate levels, women are at greater chance of lactic acidosis

Black Box Warning: Fatal hypersensitivity reactions: fever, rash, nausea, vomiting, fatigue, cough, dyspnea, diarrhea, abdominal discomfort; treatment should be discontinued and not restarted; those with HLA B5701 are at great risk for hypersensitivity; obtain genetic testing for HLA B5701 before starting treatment

⚠ **Blood dyscrasias** (anemia, granulocytopenia): bruising, fatigue, bleeding, poor healing

• Renal studies: BUN, serum uric acid, CCr before, during therapy; these may be elevated

Black Box Warning: Hepatic studies before and monthly every 2 wk during therapy: bilirubin, AST, ALT, amylase, alk phos, creatine phosphokinase, creatinine

• Blood counts; monitor viral load and CD4 counts during treatment; watch for decreasing granulocytes, Hgb; if low, therapy may have to be discontinued and restarted after hematologic recovery; blood transfusions may be required

Perform/provide:

• Storage in cool environment; protect from light; oral sol stored at room temperature; do not freeze

Evaluate:

• Therapeutic response: increased CD4 count, decrease viral load

Teach patient/family:

• That product is not a cure but will control symptoms; patient is still infective, may pass AIDS virus on to others, to carry emergency ID with condition, products taken

⚠ To notify prescriber of sore throat, swollen lymph nodes, malaise, fever; other infections may occur; to stop product if skin rash, fever, cough, shortness of breath, GI symptoms, and to notify prescriber immediately; advise all health care providers that allergic reaction has occurred with abacavir

• That follow-up visits must be continued because serious toxicity may occur; blood counts must be done

• To use contraception during treatment; if patient is pregnant, register with the Antiretroviral Pregnancy Registry at 1-800-258-4263

• Give patient Medication Guide and Warning Card, discuss points on guide

• That other products may be necessary to prevent other infections and that drug is taken with other antiretrovirals

• Not to drink alcohol while taking this product

abatacept (Rx)

(ab-a-ta'sept)

Orencia

Func. class.: Antirheumatic agent (disease modifying); immunomodulator

ACTION: A selective costimulation modulator, inhibits T-lymphocytes, inhibits production of tumor necrosis factor (TNF-α), interferon-γ, interleukin-2, which are involved in immune and inflammatory reactions

USES: Polyarticular juvenile rheumatoid arthritis; moderate to severe rheumatoid arthritis; acute, chronic rheumatoid arthritis that has not responded to other disease-modifying agents, may use in combination with DMARDs; do not use with TNF antagonists (adalimumab, etanercept, infliximab), anakinra

CONTRAINDICATIONS: Hypersensitivity, TB, viral hepatitis

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, recurrent infections, COPD

DOSAGE AND ROUTES

Rheumatoid arthritis

• **Adult:** Subcut 125 mg within 1 day after single IV loading dose, then 125 mg weekly; weekly subcut dose may be initiated without an IV loading dose for those unable to receive an infusion

- **Adult >100 kg (220 lb): IV INF** 1 g over 30 min, give at 2, 4 wk after first inf, then q4wk
- **Adult 60-100 kg (132-220 lb): IV INF** 750 mg over 30 min, give at 2, 4 wk after first inf, then q4wk
- **Adult <60 kg (132 lb): IV INF** 500 mg over 30 min, give at 2, 4 wk after first inf, then q4wk

Juvenile rheumatoid arthritis (JRA)/juvenile idiopathic arthritis (JIA)

- **Adolescent and child ≥6 yr and >100 kg: IV INF** 1 g over 30 min q2wk × 3 doses, then 1 g over 30 min q4wk starting at wk 8
- **Adolescent and child ≥6 yr and 75-100 kg: IV INF** 750 mg over 30 min q2wk × 2 doses, then 750 mg over 30 min q4wk starting at wk 8
- **Adolescent and child ≥6 yr and <75 kg: IV INF** 10 mg/kg over 30 min q2wk × 3 doses then 10 mg/kg q4wk starting at wk 8

Available forms: Lyophilized powder, single-use vials 250 mg; sol for subcut inj 125 mg/ml

Administer:

Intermittent IV INF route

- To reconstitute, remove plastic flip top from vial and wipe the top with alcohol wipe; insert syringe needle into vial and direct stream of sterile water for inj on the wall of vial; rotate vial until mixed; vent with needle to rid foam after reconstitution (25 mg/ml); further dilute in 100 ml NS from a 100-ml inf bag/bottle; withdraw the needed volume (2 vials remove 20 ml; 3 vials remove 30 ml, 4 vials remove 40 ml); slowly add the reconstituted Orencia sol from each vial into the inf bag/bottle using the same disposable syringe supplied; mix gently, discard unused portions of vials; do not use if particulate is present or discolored; give over 30 min; use non–protein-binding filter (0.2-1.2 microns), protect from light
- Do not admix with other sol or medications

SUBCUT route

- Use prefilled syringe for subcut only (do not use for IV); only those trained should use this system; allow syringe to warm to room temp (30-60 min), do not speed up warming process in any way; the amount of liquid should be between the 2 lines on the barrel, do not use the syringe if there is more or less liquid; inject into fronts of thighs, outer area of upper arm, or abdomen except for 2-inch area around the navel; do not inject into tender, bruised area
- Gently pinch skin and hold firmly, insert needle at 45-degree angle, inject full amount in 125-mg syringe
- Rotate injection sites

SIDE EFFECTS

CNS: Headache, asthenia, dizziness
CV: *Hypo/hypertension*
GI: Abdominal pain, dyspepsia, nausea
INTEG: Rash, *inj site reaction,* flushing, urticaria, pruritus
RESP: *Pharyngitis, cough, URI,* non-URI, *rhinitis,* wheezing
SYST: Anaphylaxis, malignancies, angioedema, serious infections

PHARMACOKINETICS

Terminal half-life IV 13 days, subcut 14.3 days, steady state 60 days; subcut half-life 85 days, clearance increases with increased body weight

INTERACTIONS

- Do not give concurrently with vaccines; immunizations should be brought up to date before treatment
- Do not use with TNF antagonists: adalimumab, etanercept, infliximab; anakinra
- Avoid use with corticosteroids, immunosuppressives, atropine, scopolamine, halothane

NURSING CONSIDERATIONS

Assess:

- **RA:** pain, stiffness, ROM, swelling of joints during treatment

- For latent/active TB, viral hepatitis before beginning treatment
- For inj site pain, swelling
- Patient's overall health at each visit; product should not be given with active infections; parenteral product contains maltose, glucose monitoring must be done with glucose-specific testing

⚠ **Infection:** sinusitis, urinary tract infection, influenza, bronchitis; serious infections have occurred

Perform/provide:
- Storage in refrigerator; do not use expired vials, protect from light, do not freeze

Evaluate:
- Therapeutic response: decreased inflammation, pain in joints

Teach patient/family:
- That product must be continued for prescribed time to be effective
- To use caution when driving; dizziness may occur
- Not to have vaccinations while taking this product
- About patient information included in packaging

RARELY USED
⚠ HIGH ALERT

abciximab (Rx)

(ab-six'i-mab)

ReoPro

Func. class.: Platelet aggregation inhibitor

USES: Used with heparin and aspirin to prevent acute cardiac ischemia after percutaneous transluminal coronary angioplasty in patients with NSTEMI or UA when percutaneous coronary intervention (PCI) is planned within 24 hr

Unlabeled uses: Acute MI, Kawasaki disease (child)

CONTRAINDICATIONS: Hypersensitivity to this product or murine protein; GI, GU bleeding; CVA within 2 yr, bleeding disorders, intracranial neoplasm, intracranial arteriovenous malformations, intracranial aneurysm, platelet count $<100{,}000/mm^3$, recent surgery, aneurysm, uncontrolled severe hypertension, vasculitis, coagulopathy

DOSAGE AND ROUTES

PCI
- **Adult: IV BOL** 250 mcg (0.25 mg)/kg 10-60 min before PCI followed by 0.125 mcg/kg/min **CONT INF** for 12 hr

MI (unlabeled)
- **Adult: IV BOL** 0.25 mg/kg over 5 min, then 0.125 mcg/kg/min (max 10 mcg/min); **IV INF** for 12 hr unless complications

abiraterone

(a'bir-a'ter-one)

Zytiga

Func. class.: Androgen inhibitor

ACTION: Converted to abiraterone which inhibits CYP17, the enzyme required for androgen biosynthesis; androgen-sensitive prostate cancer responds to treatment that decreases androgens

USES: Metastatic castration-resistant prostate cancer in combination with predniSONE for patients who have received prior chemotherapy containing docetaxel

CONTRAINDICATIONS: Pregnancy (X), women, children

Precautions: Adrenal insufficiency, cardiac disease, MI, heart failure, hepatic disease, hypertension, hypokalemia, infection, surgery, ventricular dysrhythmia

DOSAGE AND ROUTES

- **Adult males: PO** 1000 mg/day with predniSONE 5 mg bid

Hepatic dose

• **Adult males (Child-Pugh B, 7-9): PO** 250 mg/day with predniSONE; (Child-Pugh C, >10) do not use

Available forms:

Tabs 250 mg

Administer:

PO route

• Give whole, on empty stomach 2 hr before or 1 hr after meals with full glass of water

⚠ Women who are pregnant or may become pregnant should not touch tabs without gloves

SIDE EFFECTS

CV: Angina, dysrhythmia exacerbation, atrial flutter/fibrillation/tachycardia, AV block, chest pain, edema, heart failure, MI, hypertension, QT prolongation, sinus tachycardia, supraventricular tachycardia, ventricular tachycardia

ENDO: Hot flashes

GI: Diarrhea, dyspepsia

GU: Increased urinary frequency, nocturia, urinary tract infection

META: Adrenocortical insufficiency, hyperbilirubinemia, hypertriglyceridemia, hypokalemia, hypophosphatemia

MS: Arthralgia, myalgia

RESP: Cough, upper respiratory infection

SYST: Infection

PHARMACOKINETICS

99% protein binding, converted to abiraterone (active metabolite), mean terminal half-life 7-17 hr; excreted 88% in feces, 5% in urine; high-fat food increases effect, give on empty stomach; increased effect in hepatic disease

INTERACTIONS

Avoid use with: CYP3A4 inhibitors (clarithromycin, atazanavir, nefazodone, saquinavir, telithromycin, ritonavir, indinavir, nelfinavir, voriconazole, ketoconazole, itraconazole); loperamide, guinine, naprosen, pioglitazone, pitavastin, repaglinide, rosiglitazone

Avoid use with: CYP3A4 inducers (carBAMazepine, phenytoin, rifampin, rifabutin, rifapentine, PHENobarbital)

Increase action of CYP2D6 substrate—dextromethorphan, thioridazine; dose of these products should be reduced

Drug/Food

Increase: abiraterone action—must be taken on an empty stomach

NURSING CONSIDERATIONS

Assess:

• **Prostate cancer:** monitor prostate specific antigen (PSA), serum potassium

⚠ **Hepatotoxicity:** monitor liver function tests (AST/ALT) at baseline, every 2 wk for 3 mo, monthly thereafter in patients with no known hepatic disease; interrupt treatment in patients without known hepatic disease at baseline who develop ALT/AST >5 × ULN or total bilirubin >3 × ULN; patients with moderate hepatic disease at baseline, measure ALT, AST, bilirubin before the start of treatment, every wk for 1 month, every 2 wk for the following 2 mo, monthly thereafter; if elevations in ALT and/or AST >5 × ULN or total bilirubin >3 × ULN occur in patients with moderate hepatic impairment at baseline, discontinue and do NOT restart; measure serum total bilirubin, AST/ALT if hepatotoxicity is suspected; elevations of AST, ALT, bilirubin from baseline should prompt more frequent monitoring.

• Musculoskeletal pain, joint swelling, discomfort: arthritis, arthralgia, joint swelling, and joint stiffness, some severe; muscle discomfort that included muscle spasms, musculoskeletal pain, myalgia, musculoskeletal discomfort, and musculoskeletal stiffness may be relieved with analgesics

• Signs, symptoms of adrenocorticoid insufficiency; monthly for hypertension, hypokalemia, fluid retention

⚠ **QT prolongation:** Monitor ECG for QT prolongation, ejection fraction in patients with cardiac disease, small increases in the QTc interval such as <10 ms have occurred; monitor for arrhythmia exacer-

bation such as sinus tachycardia, atrial fibrillation, supraventricular tachycardia (SVT), atrial tachycardia, ventricular tachycardia, atrial flutter, bradycardia, AV block complete, conduction disorder, bradyarrhythmia

Perform/provide:
- Storage of tabs at room temp

Teach patient/family:
⚠ That women must not come in contact with tabs; wear gloves if product needs to be handled, pregnancy (X)
- To report chest pain, swelling of joints, burning/pain when urinating

acamprosate
(a-kam-pro'sate)
Campral
Func. class.: Alcohol deterrent
Chem. class.: Synthetic amino acid neurotransmitter analog

ACTION: Not completely understood; in vitro data suggest it has affinity for type A and type B GABA receptors, lowers neuronal excitability, centrally mediated

USES: Alcohol abstinence management

CONTRAINDICATIONS:

Black Box Warning: Hypersensitivity to this product or sulfites, creatinine clearance ≤30 ml/min

Precautions: Pregnancy (C), breastfeeding, infants, children, ethanol intoxication, renal impairment, depression, suicidal ideation, driving or operating machinery, geriatric patients

DOSAGE AND ROUTES

- **Adult: PO** 666 mg tid

Renal dosage
- **Adult: PO** CCr 30-50 ml/min 333 mg tid; CCr <30 ml/min do not use

Available forms: Del-rel tabs 333 mg

Administer
- Without regard to food; do not crush, chew, break delayed-release tab
- Use only after alcohol is stopped

SIDE EFFECTS

CNS: Anxiety, depression, dizziness, headache, insomnia, paresthesias, suicidal ideation, tremor, abnormal thoughts, chills, drowsiness
CV: Palpitations, hypertension, peripheral edema
EENT: Rhinitis, pharyngitis, abnormal vision
GI: Anorexia, constipation, diarrhea, dry mouth, abdominal pain, flatulence, nausea, vomiting, taste change, weight gain
GU: Impotence
INTEG: Rash, pruritus, increased sweating
MISC: Infection, flulike syndrome
MS: Back pain, myalgias, arthralgia
RESP: Dyspnea, bronchitis

PHARMACOKINETICS

Peak 3-8 hr, half-life 20-33 hr

INTERACTIONS

Increase: LFTs, blood glucose, bilirubin, uric acid
Decrease: Hgb/Hct, platelets

NURSING CONSIDERATIONS

Assess:
- Mental status: depression, abnormal thinking, suicidal thoughts/behaviors, length of alcohol use, date of discontinuing alcohol use
- B/P baseline and periodically

Perform/provide:
- Storage at room temperature

Evaluate:
- Therapeutic response: Continued alcohol abstinence

Teach patient/family:
- To notify prescriber of depression, abnormal thoughts, suicidal thoughts/behaviors
- To take without regard to food; not to break, crush, chew delayed release tabs

• To notify prescriber if pregnancy is planned or suspected, to use effective contraception
• Not to engage in hazardous activities until effect is known

acarbose (Rx)

(ay-car'bose)

Precose

Func. class.: Oral antidiabetic
Chem. class.: α-Glucosidase inhibitor

Do not confuse:
Precose/preCare

ACTION: Delays digestion/absorption of ingested carbohydrates by inhibiting α-glucosidase, results in smaller rise in postprandial blood glucose after meals; does not increase insulin production

USES: Type 2 diabetes mellitus, alone or in combination with a sulfonylurea, metformin
Unlabeled uses: Adjunct in type 1 diabetes mellitus

CONTRAINDICATIONS: Breastfeeding, hypersensitivity, diabetic ketoacidosis, cirrhosis, inflammatory bowel disease, ileus, colonic ulceration, partial intestinal obstruction, chronic intestinal disease, serum creatinine >2 mg/dl, CCr <25 ml/min
Precautions: Pregnancy (B), children, renal/hepatic disease

DOSAGE AND ROUTES

• **Adult >60 kg (132 lb): PO** 25 mg tid initially, with 1st bite of meal; maintenance dose may be increased to 50-100 mg tid; dosage adjustment at 4-8 wk intervals, individualized
• **Adult <60 kg (132 lb): PO** max 50 mg tid

Type 1 diabetes mellitus (unlabeled)

• **Adult: PO** 50 mg tid with meals × 2 wk, then 100 mg tid with meals

Available forms: Tabs 25, 50, 100 mg
Administer:
PO route
• With 1st bite of each meal 3 ×/day

SIDE EFFECTS

GI: *Abdominal pain, diarrhea, flatulence*

PHARMACOKINETICS

Poor systemic absorption, peak 1 hr, duration 2-4 hr, metabolized in GI tract, excreted as intact product in urine, half-life 2 hr

INTERACTIONS

Increase: acetaminophen toxicity—acetaminophen combined with alcohol
Increase or decrease: glycemic control—androgens, lithium, bortezomib, quinolones
Decrease: effect of digoxin
• Do not use with gatifloxacin
Increase: hypoglycemia—sulfonylureas, insulin, MAOIs, salicylates, fibric acid derivatives, bile acid sequestrants, ACE inhibitors, angiotensin II receptor antagonists, beta blockers
Decrease: effect, increase hyperglycemia—digestive enzymes, intestinal absorbents, thiazide diuretics, loop diuretics, corticosteroids, estrogen, progestins, oral contraceptives, sympathomimetics, isoniazid, phenothiazines; protease inhibitors, atypical antipsychotics, carbonic anhydrase inhibitors, cycloSPORINE, tacrolimus, baclofen

Drug/Herb
Increase: hypoglycemia—chromium, garlic, horse chestnut

Drug/Lab Test
Increase: ALT, AST
Decrease: calcium, vit B_6, Hgb, Hct

NURSING CONSIDERATIONS

Assess:
• **Hypoglycemia** (weakness, hunger, dizziness, tremors, anxiety, tachycardia, sweating), hyperglycemia; even though product does not cause hypoglycemia, if

patient is on sulfonylureas or insulin, hypoglycemia may be additive; if hypoglycemia occurs, treat with dextrose, or, if severe, with IV glucose or glucagon
• For stress, surgery, or other trauma that may require change in dose
• Monitor AST, ALT q3mo × 1 yr and periodically thereafter; if elevated, dose may need to be reduced or discontinued, usually increased with doses ≥300mg/day; A1c q3mo, monitor serum glucose, 1 hr PP throughout treatment
• GI side effects for tolerability/compliance

Perform/provide:
• Storage in tight container in cool environment

Evaluate:
• Therapeutic response: improved signs/symptoms of diabetes mellitus (decreased polyuria, polydipsia, polyphagia; clear sensorium, absence of dizziness, stable gait)

Teach patient/family:
• The symptoms of hypo/hyperglycemia, what to do about each
• That medication must be taken as prescribed; explain consequences of discontinuing medication abruptly; that insulin may need to be used for stress, including trauma, surgery, fever
• To avoid OTC medications and herbal supplements unless approved by health care provider
• That diabetes is a lifelong illness; that the diet and exercise regimen must be followed; that this product is not a cure
• To carry emergency ID and a glucose source; to avoid sugar, because sugar is blocked by acarbose
• That blood glucose monitoring is required to assess product effect
• To avoid breastfeeding if using acarbose with other antidiabetics
• That GI side effects may occur

acetaminophen (OTC)

(a-seat-a-mee'noe-fen)

Acephen, Apacet, APAP, Apra, Children's Feverall, Equaline Children's Pain Relief, Equaline Infant's Pain Relief, Genapap, GoodSense Acetaminophen, GoodSense Children's Pain Relief, Infantaire, Leader Children's Pain Reliever, Mapap, Neopap, Ofirmev, Q-Pap, Q-Pap Children's, Redutemp, Ridenol, Silapap, Tempra, T-Painol, Tylenol, Walgreen's Non-Aspirin, XS pain reliever

Func. class.: Nonopioid analgesic, antipyretic

Chem. class.: Nonsalicylate, paraaminophenol derivative

ACTION: May block pain impulses peripherally that occur in response to inhibition of prostaglandin synthesis; does not possess antiinflammatory properties; antipyretic action results from inhibition of prostaglandins in the CNS (hypothalamic heat-regulating center)

USES: Mild to moderate pain or fever, arthralgia, dental pain, dysmenorrhea, headache, myalgia, osteoarthritis
Unlabeled uses: Migraine

CONTRAINDICATIONS: Hypersensitivity
Precautions: Pregnancy (B), (C) IV; breastfeeding, geriatric patients, anemia, renal/hepatic disease, chronic alcoholism

DOSAGE AND ROUTES

• **Adult/child >12 yr: PO/RECT** 325-650 mg q4-6hr prn, max 4 g/day; weight ≥50 kg IV 1000 mg q6hr or 650 mg q4hr prn, max single dose 1000 mg, min dosing interval 4 hr; weight <50 kg IV 15 mg/kg/dose q6hr or 12.5 mg/kg/dose q4hr, max single dose 15 mg/kg, min dosing interval 4 hr, max 75 mg/kg/day from all sources, ext rel 650-1300 mg q 8 hr as needed, max 4 g/day

• **Child ≥2 yr and <50 kg: IV** 15 mg/kg/dose q6hr or 12.5 mg/kg/dose q4hr, max single dose 15 mg/kg, min dosing interval 4 hr, max 75 mg/kg/day from all sources

• **Child 1-12 yr: PO** 10-15 mg/kg q4-6hr, max 5 doses/24 hr

• **Child 1-12 yr: RECT** 10-20 mg/kg/dose q4-6hr

• **Neonate: RECT** 10-15 mg/kg/dose q6-8hr

Migraine (unlabeled)

• **Adult and adolescent: PO/RECT** 500-1000 mg, max 1 g/dose or max 4 g/day

Available forms: Rect supp 120, 325, 650 mg; soft chew tabs 80 mg; caps 500 mg; elix 120, 160, 325 mg/5 ml; oral disintegrating tab 80, 160 ml; oral drops 80 mg/0.8 ml, liquid 500 mg/5 ml, 160/5 ml, 1000/30 ml; ext rel 650 mg, 80 mg/ml; tabs 325, 500, 650 mg; sol for inj 1000 mg/100 ml

Administer:

PO route

• Crushed or whole, do not crush EXT REL product; chewable tabs may be chewed; give with full glass of water

• With food or milk to decrease gastric symptoms if needed

• Susp after shaken well; check elixir, liquid, suspension concentration carefully, susp and cups are bioequivalent

Intermittent IV INF route

• No further dilution needed; do not add other medications to vial or inf device

• For doses equal to single vial, averted IV set may be used to deliver directly from vial; for doses less than a single vial, withdraw dose and place in an empty sterile syringe, plastic IV container, or glass bottle; infuse over 15 min

• Discard unused portion; if seal is broken, vial penetrated, or drug transferred to another container, give within 6 hr

SIDE EFFECTS

GI: Nausea, vomiting, abdominal pain; hepatotoxicity, hepatic seizure (overdose), GI bleeding

GU: Renal failure (high, prolonged doses)

HEMA: Leukopenia, neutropenia, hemolytic anemia (long-term use), thrombocytopenia, pancytopenia

INTEG: Rash, urticaria

SYST: Hypersensitivity

TOXICITY: Cyanosis, anemia, neutropenia, jaundice, pancytopenia, CNS stimulation, delirium followed by vascular collapse, seizures, coma, death

PHARMACOKINETICS

85%-90% metabolized by liver, excreted by kidneys; metabolites may be toxic if overdose occurs; widely distributed; crosses placenta in low concentrations; excreted in breast milk; half-life 1-4 hr

PO: Onset 10-30 min, peak ½-2 hr, duration 4-6 hr, well absorbed

RECT: Onset slow, peak 1-2 hr, duration 4-6 hr, absorption varies

INTERACTIONS

• Avoid use with salicylates

• Renal adverse reactions: NSAIDs, salicylates

Increase: Hypoprothrombinemia: warfarin, long-term use, high doses of acetaminophen

Increase: hepatotoxicity—barbiturates, alcohol, carbamazepine, hydantoins, rifampin, rifabutin, isoniazid, diflunisal, zidovudine, lamotrigine, imatinib

Decrease: absorption—colestipol, cholestyramine

Drug/Herb

Increase: heptatotoxicity—St. John's wort, due to acetaminophen metabolism

Increase: hepatotoxicity—echinacea (rare)

Drug/Lab Test

Interference: 5-HIAA

Increase: LFTs, potassium, bilirubin, LDH, pro-time

Decrease: Hgb/Hct, WBC, RBC, platelets; albumin, magnesium, phosphate (pediatrics)

NURSING CONSIDERATIONS

Assess:

- Hepatic studies: AST, ALT, bilirubin, creatinine before therapy if long-term therapy is anticipated; may cause hepatic toxicity at doses >4 g/day with chronic use
- Renal studies: BUN, urine creatinine, occult blood, albumin, if patient is on long-term therapy; presence of blood or albumin indicates nephritis
- Blood studies: CBC, PT if patient is on long-term therapy
- I&O ratio; decreasing output may indicate renal failure (long-term therapy)
- For fever and pain: type of pain, location, intensity, duration
- **Chronic poisoning:** rapid, weak pulse; dyspnea; cold, clammy extremities; report immediately to prescriber
- **Hepatotoxicity:** dark urine; clay-colored stools; yellowing of skin, sclera; itching; abdominal pain; fever; diarrhea if patient is on long-term therapy
- **Allergic reactions:** rash, urticaria; if these occur, product may have to be discontinued

Perform/provide:

- Storage of suppositories <80° F (27° C)

Evaluate:

- Therapeutic response: absence of pain using pain scoring; fever

Teach patient/family:

⚠ Not to exceed recommended dosage; the elixir, liquid, suspension come in several concentrations, read label carefully; acute poisoning with liver damage may result; tell parents of children to check products carefully; that acute toxicity includes symptoms of nausea, vomiting, abdominal pain and that prescriber should be notified immediately; that toxicity may occur when used with other combination products

- Not to use with alcohol, herbals, OTC products without approval of prescriber
- May be used when breastfeeding, short-term
- To recognize signs of chronic overdose: bleeding, bruising, malaise, fever, sore throat
- That those with diabetes may notice blood glucose monitoring changes
- To notify prescriber of pain or fever lasting more than 3 days, not to be used in patients <2 yr unless approved by prescriber

TREATMENT OF OVERDOSE:

Product level, gastric lavage, activated charcoal; administer oral acetylcysteine to prevent hepatic damage *(see acetylcysteine monograph)*; monitor for bleeding

acetaZOLAMIDE (Rx)

(a-set-a-zole'a-mide)

Diamox Sequels

Func. class.: Diuretic, carbonic anhydrase inhibitor, antiglaucoma agent, antiepileptic

Chem. class.: Sulfonamide derivative

Do not confuse:

acetaZOLAMIDE/acetoHEXAMIDE

Diamox/Trimox/Dobutrex

ACTION: Inhibits carbonic anhydrase activity in proximal renal tubules to decrease reabsorption of water, sodium, potassium, bicarbonate resulting in increased urine volume and alkalinization of urine; decreases carbonic anhydrase in CNS, increasing seizure threshold; able to decrease secretion of aqueous humor in eye, which lowers intraocular pressure

USES: Open-angle glaucoma, angle-closure glaucoma (preoperatively, if sur-

gery delayed), seizures (petit mal, grand mal, mixed, absence), edema in CHF, product-induced edema, acute altitude sickness

Unlabeled uses: Urine alkalinization, metabolic alkalosis in mechanical ventilation, decrease CSF production in infants with hydrocephalus, familial periodic paralysis, nystagmus

CONTRAINDICATIONS: Hypersensitivity to sulfonamides, severe renal/hepatic disease, electrolyte imbalances (hyponatremia, hypokalemia), hyperchloremic acidosis, Addison's disease, long-term use for closed-angle glaucoma, adrenocortical insufficiency

Precautions: Pregnancy (C), breastfeeding, hypercalciuria, respiratory acidosis, pulmonary obstruction/emphysema, COPD

DOSAGE AND ROUTES

Angle-closure glaucoma

• **Adult: PO/IV** 250 mg q4hr or 250 mg bid for short-term therapy

Open-angle glaucoma

• **Adult: PO/IV** 250 mg/day in divided doses for amounts of more than 250 mg or 500 mg **EXT REL** bid, max 1 g/day

Edema in CHF

• **Adult: PO/IV** 250-375 mg/day or 5 mg/kg in AM, give for 2 days, then 1-2 days drug free

• **Child: PO/IV** 5 mg/kg/day or 150 mg/m^2 in AM

Seizures

• **Adult: PO/IV** 8-30 mg/kg/day, in 1-4 divided doses, usual range 375-1000 mg/day; **ER** not recommended with seizures

• **Child: PO/IV** 8-30 mg/kg/day in divided doses tid or qid, or 300-900 mg/m^2/day, not to exceed 1 g/day

Altitude sickness

• **Adult: PO** 250 mg q6-12hr; **EXT REL** 500 mg q12-24hr, start therapy 24-48 hr before ascent and give for ≥48 hr after arrival at high altitude

• **Geriatric: PO** 250 mg bid, use lowest effective dose

Renal dose

• **Adult: PO/IV** CCr 50-80 ml/min give dose ≥6 hr reg rel of IV; CCr 10-50 ml/min give dose q12hr; CCr <10 ml/min, avoid use

Infants with hydrocephalus (unlabeled)

• **Infant: PO/IV** 5 mg/kg q6hr, may increase by 25 mg/kg/day; max 100 mg/kg/day

Urine alkalinization (unlabeled)

• **Adult: IV** 5 mg/kg/dose, repeat 2-3× over 24 hr

Familial periodic paralysis (unlabeled)

• **Adult: PO** 250-375 mg/day in divided doses

Metabolic alkalosis in mechanical ventilation (unlabeled)

• **Adult: IV** 500 mg as a single dose or 250 mg q6hr × 4 doses

Vestibular nystagmus (unlabeled)

• **Adult: PO** 250 mg, increase by 250 mg q3days; max 3 g/day in divided doses

Available forms: Tabs 125, 250 mg; ext rel caps 500 mg; inj 500 mg

Administer:

• In AM to avoid interference with sleep if using product as diuretic

• Potassium replacement if potassium level is <3 mg/dl

PO route

• Do not break, crush, or chew ext rel caps; this product should be used for altitude sickness, glaucoma

• With food if nausea occurs; absorption may be decreased slightly

IV route

• After diluting 500 mg in ≥5 ml sterile water for inj; **direct IV:** give at 100-500 mg/min; **intermittent INF:** may be diluted further in LR, D_5W, $D_{10}W$, 0.45% NaCl, 0.9% NaCl, or Ringer's sol and infused over 15-30 min; use within 24 hr of dilution

Additive compatibilities: cimetidine, ranitidine

SIDE EFFECTS

CNS: Anxiety, *confusion*, seizures, *depression*, dizziness, *drowsiness*, *fatigue*, headache, *paresthesia*, stimulation
EENT: Myopia, tinnitus
ENDO: *Hyperglycemia*
GI: *Nausea*, *vomiting*, *anorexia*, *diarrhea*, melena, *weight loss*, hepatic insufficiency, cholestatic jaundice, fulminant hepatic necrosis, *taste alterations*, bleeding
GU: *Frequency*, *polyuria*, uremia, glucosuria, hematuria, dysuria, crystalluria, renal calculi
HEMA: Aplastic anemia, hemolytic anemia, leukopenia, thrombocytopenia, purpura, pancytopenia
INTEG: *Rash*, pruritus, urticaria, fever, Stevens-Johnson syndrome, photosensitivity, flushing, toxic epidermal necrolysis
META: *Hypokalemia*, *hyperchloremic acidosis*, hyponatremia, sulfonamide-like reactions, metabolic acidosis

PHARMACOKINETICS

65% absorbed if fasting (oral), 75% absorbed if given with food; half-life 2½-5½ hr; excreted unchanged by kidneys (80% within 24 hr), crosses placenta
PO: Onset 1-1½ hr, peak 2-4 hr, duration 8-12 hr
PO-EXT REL: Onset 2 hr, peak 8-12 hr, duration 18-24 hr
IV: Onset 2 min, peak 15 min, duration 4-5 hr

INTERACTIONS

Increase: action of—amphetamines, flecainide, memantine, phenytoin, procainamide, quinidine, anticholinergics, methenamine, mecamylamine, ePHEDrine, memantine, mexiletene, quiNIDine, folic acid antagonists
Increase: excretion of lithium, primidone
Increase: osteomalacia—carBAMazepine, ethotoin
Increase: toxicity—salicylates, cycloSPORINE
Increase: hypokalemia—corticosteroids, amphotericin B, corticotropin, ACTH
Increase: cardiac toxicity if hypokalemia develops—arsenic trioxide, cardiac glycosides, levomethadyl
Increase: renal stone formation, heat stroke—topiramate (avoid concurrent use)
Decrease: primidone levels
Drug/Lab Test
Increase: glucose, bilirubin, calcium, uric acid
Decrease: thyroid iodine uptake
False positive: urinary protein, 17 hydroxysteroid

NURSING CONSIDERATIONS

Assess:
• Edema: weight daily, I&O daily to determine fluid loss; effect of product may be decreased if used daily; monitor geriatric patients for dehydration
• Ocular status: intraocular pressure, ophthalmologic examination
• For cross-sensitivity with other sulfonamides and this product
• B/P lying, standing; postural hypotension may occur
• Electrolytes: potassium, sodium, chloride; also BUN, blood glucose, CBC, serum creatinine, blood pH, ABGs, LFTs; I&O, platelet count, patient may need to be on a high-potassium diet; identify signs of hypokalemia (vomiting, fatigue, weakness)
• **Seizures:** neurologic status, provide seizure precaution
Perform/provide:
• Storage in dark, cool area; use reconstituted solution within 24 hr
Evaluate:
• Therapeutic response: improvement in edema of feet, legs, sacral area daily if medication is being used for CHF; decrease in aqueous humor if medication is being used for glaucoma; decreased frequency of seizures, prevention of altitude sickness

Teach patient/family:

- To take exactly as prescribed; if dose is missed, take as soon as remembered; do not double dose
- Altitude sickness: to avoid rapid ascent
- Diabetic: that drug may increase blood glucose and to monitor blood glucose
- To use sunscreen to prevent photosensitivity
- To avoid hazardous activities if drowsiness occurs
- To increase fluids to 2-3 L/day if not contraindicated

⚠ To report nausea, vertigo, rapid weight gain, change in stools, weakness, numbness, rash, sore throat, bleeding/bruising; Stevens-Johnson syndrome, toxic epidermal necrolysis (blistering, red rash that spreads)

TREATMENT OF OVERDOSE:

Lavage if taken orally; monitor electrolytes; administer dextrose in saline; monitor hydration, CV, renal status

acetylcholine ophthalmic

See Appendix B

acetylcysteine (Rx)

(a-se-tēel-sis'tay-een)

Acetadote, Mucomyst ♣

Func. class.: Mucolytic; antidote—acetaminophen

Chem. class.: Amino acid L-cysteine

Do not confuse:

acetylcysteine/acetylcholine

Mucomyst/Mucinex

ACTION: Decreases viscosity of secretions by breaking disulfide links of mucoproteins; serves as a substrate in place of glutathione, which is necessary to inactivate toxic metabolites with acetaminophen overdose

USES: Acetaminophen toxicity; bronchitis; cystic fibrosis; COPD; atelectasis

Unlabeled uses: Prevention of contrast medium nephrotoxicity

CONTRAINDICATIONS: Hypersensitivity, increased intracranial pressure, status asthmaticus

Precautions: Pregnancy (B), breastfeeding, hypothyroidism, Addison's disease, CNS depression, brain tumor, asthma, renal/hepatic disease, COPD, psychosis, alcoholism, seizure disorders, bronchospasms, asthma, anaphylactoid reactions, fluid restriction, weight <40 kg

DOSAGE AND ROUTES

Acetaminophen toxicity

- **Adult and child: PO** 140 mg/kg, then 70 mg/kg q4hr × 17 doses to total of 1330 mg/kg; **IV** loading dose 150 mg/kg over 60 min (dilution 150 mg/kg in 200 ml of D_5); maintenance dose 1: 50 mg/kg over 4 hr (dilution 50 mg/kg in 500 ml D_5): maintenance dose 2: 100 mg/kg over 16 hr (dilution 100 mg/kg in 1000 ml D_5)

Mucolytic

- **Adult and child: INSTILL** 1-20 ml (10%-20% sol) q6-8hr prn or 3-5 ml (20% sol) or 6-10 ml (10% sol) tid or qid; nebulization (face mask, mouthpiece, tracheostomy) 1-10 ml of a 20% sol, or 2-20 ml of a 10% sol, q6-8hr; nebulization (tent, croupette) may require large dose, up to 300 ml/treatment

Nephrotoxicity prophylaxis (unlabeled)

- **Adult: PO** 600 mg bid, given day before and day of administration of contrast media or **IV** 150 mg/kg in 500 ml NS over 30 min before contrast, then 50 mg/kg in 500 ml NS over the next 4 hr; **IV BOL** 1200 mg before contrast medium and 1200 mg **PO** bid for 48 hr (MI undergoing angioplasty)

Available forms: Oral sol 10%, 20%; inj 20% (200 mg/ml)

Administer:

PO route

- **Antidotal use:** give within 24 hr; dilute 10% or 20% sol to a 5% sol with diet soda, may use water if giving via gastric tube; dilution of 10% sol 1:1, 20% sol 1:3, store open undiluted solution refrigerated ≤96 hr

Direct intratracheal instill route

- By syringe: 1-2 ml of 10%-20% sol up to q1hr
- Decreased dose to geriatric patients; metabolism may be slowed
- Only if suction machine is available
- Before meals ½-1 hr for better absorption, to decrease nausea
- 20% sol diluted with NS or water for inj; may give 10% sol undiluted
- Only after patient clears airway by deep breathing, coughing

IV route

- **21-hr regimen:** loading dose: dilute 150 mg/kg in 200 ml D_5W; maintenance dose 1: dilute 50 mg/kg in 500 ml D_5W; maintenance dose 2: dilute 100 mg/kg in 1000 ml D_5W, give loading dose over 15 min, give maintenance dose 1 over 4 hr; give maintenance dose 2 over 16 hr, administer sequentially without time between doses

SIDE EFFECTS

CNS: *Dizziness, drowsiness,* headache, fever, chills

CV: Hypotension, flushing tachycardia

EENT: *Rhinorrhea,* tooth damage

GI: *Nausea,* stomatitis, constipation, vomiting, anorexia, hepatotoxicity, diarrhea

INTEG: Urticaria, rash, fever, clamminess, pruritus

RESP: Bronchospasm, burning, hemoptysis, chest tightness, cough, dyspnea

MISC: Anaphylaxis, angioedema

PHARMACOKINETICS

PO: (antidote), peak 1-2 hr, duration 4 hr

INH/INSTILL: Onset 5-10 min, peak 10 min, duration 1 hr

Excreted in urine, half-life 5.6 hr (adult), 11 hr (newborn)

IV: Protein binding 83%

INTERACTIONS

- Do not use with iron, copper, rubber, nickel, activated charcoal

Increase: effect—nitrates

NURSING CONSIDERATIONS

Assess:

- **Mucolytic use:** cough—type, frequency, character, including sputum
- Rate, rhythm of respirations, increased dyspnea; sputum; discontinue if bronchospasm occurs
- VS, cardiac status including checking for dysrhythmias, increased rate, palpitations
- ABGs for increased CO_2 retention in asthma patients
- **Antidotal use:** LFTs, PT, BUN, creatinine, glucose, electrolytes, acetaminophen levels; inform prescriber if dose is vomited or vomiting is persistent
- Nausea, vomiting, rash; notify prescriber if these occur

Perform/provide:

- Storage in refrigerator; use within 96 hr of opening
- Assistance with inhaled dose: bronchodilator if bronchospasm occurs; mechanical suction if cough insufficient to remove excess bronchial secretions

Evaluate:

- Therapeutic response: absence of purulent secretions when coughing, clear lung sounds (mucolytic use); absence of hepatic damage with acetaminophen toxicity

Teach patient/family:

- That foul odor and smell may be unpleasant
- To clear airway for inhalation
- That discoloration of sol after bottle is opened does not impair its effectiveness
- To report vomiting because dose may need to be repeated

aclidinium

(a'kli-din'ee-um)

Tudorza Pressair

Func. class.: Anticholinergic, bronchodilator

Chem. class.: Synthetic quaternary ammonium compound

ACTION: Inhibits interaction of acetylcholine at receptor sites on the bronchial smooth muscle, thereby resulting in decreased cGMP and bronchodilation

USES: Long-term maintenance treatment of bronchospasm in COPD, emphysema, chronic bronchitis, not indicated for initial treatment of acute episodes

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (C), breastfeeding, milk sensitivity, contact lenses, narrow-angle glaucoma, neonates, ocular exposure, prostatic hypertrophy, bladder obstruction

DOSAGE AND ROUTES

• **Adults, including geriatric patients:** Oral inhalation 400 μg (1 actuation) bid; doses should be 12 hours apart

Available forms: Powder for inhalation 400 μg/actuation

Administer

Oral inhalation route

• Before initial use, remove inhaler from pouch; remove the cap by squeezing the arrows marked on each side and pulling outward; instruct the patient to hold the inhaler with the mouthpiece facing patient but not inside the mouth; the green button should be facing straight up

• Before placing the inhaler into the mouth, the green button should be pushed all the way down and then released; patient should not continue to hold it down. Once the green button is pressed, the control window changes from red to green, indicating that the medication is ready for inhalation. If the control window remains red, repeat the press-and-release actions until the control window is green

• Before inhaling the dose, have patient breathe out completely away from the inhaler; patient should never breathe out into the inhaler

• Instruct patient to put their lips tightly around the mouthpiece and to breathe in quickly and deeply through the mouth until a click sound is heard

• The patient should remove the inhaler from the mouth and hold breath for as long as is comfortable, then breathe out slowly through the nose

• The control window should turn red after the full dose has been inhaled. If it remains green after the dose is inhaled, the inhalation process should be repeated. If correct inhalation has not been achieved after several attempts, the doctor or health care professional should be contacted

• Once the window has turned red, the protective cap should be placed back onto the inhaler by pressing it back onto the mouthpiece

• The dose indicator displays how many doses are left. The first time the inhaler is used, the indicator displays the number 60. The indicator number counts down as the patient uses the inhaler

• Discard inhaler when the marking "0" with red background shows in the middle of the dose indicator, the device locks out, after 45 days (whichever comes first); the inhaler does not need to be cleaned

SIDE EFFECTS

CNS: *Anxiety, dizziness, headache,* nervousness

CV: Palpitation

EENT: Dry mouth, blurred vision, nasopharyngitis congestion

GI: *Nausea, vomiting, diarrhea*

INTEG: Rash

RESP: *Cough, worsening of symptoms,* **bronchospasm**

PHARMACOKINETICS

Half-life 5-8 hr

INTERACTIONS

Increase: toxicity—other bronchodilators

NURSING CONSIDERATIONS

Assess:

- Tolerance over long-term therapy; dose might have to be increased or changed
- Respiratory status: rate, rhythm, auscultate breath sounds before and after administration, pulmonary function tests at baseline and periodically

Evaluate:

- Therapeutic response: Ability to breathe adequately

Teach patient/family:

- That compliance is necessary with number of inhalations/24 hr or overdose can occur; about spacer device for geriatric patients; that max therapeutic effects can take 2-3 mo
- About the correct method of inhalation
- To report any visual effects or urinary retention

activated charcoal (OTC)

Actidose-Aqua, Actidose with Sorbitol, Charcoal Plus, Charcoal Plus DS, Charcocaps, EZ Char

Func. class.: Antiflatulent; antidote

Do not confuse:
Actidose/Actos

ACTION: Binds poisons, toxins, irritants; increases adsorption in GI tract; inactivates toxins and binds until excreted

USES: Poisoning, overdose
Unlabeled uses: Diarrhea, flatulence

CONTRAINDICATIONS: Hypersensitivity to this product, unconsciousness, semiconsciousness, cyanide poisoning, mineral acids, alkalis, gag reflex depression, ethanol intoxication, intestinal obstruction, absent bowel sounds
Precautions: Pregnancy (C), hypersensitivity to quiNIDine, quiNINE

DOSAGE AND ROUTES

Children should not get more than 1 dose of products that contain sorbitol

Poisoning

- Tabs/caps should not be used for poisonings
- **Adult/adolescents: PO** (activated charcoal aqueous susp) 5-10 × estimated weight of drug/chemical ingested or 50-100 g dose, may repeat q4-6hr as needed; (activated charcoal with sorbitol susp) 50 g as a single dose, do not use multiple dosing
- **Child: PO** (activated charcoal aqueous susp) 1-2 g/kg/dose or 25-50 g dose, may repeat as needed q4-6hr
- **Infant: PO** (activated charcoal aqueous susp) 1 g/kg/dose, may repeat as needed q4-6hr

Diarrhea/flatulance (unlabeled)

- **Adult: PO** (CharcoCaps) 520 mg (2 caps) after meals or prn, max 4.16 g (16 cap)/day

Available forms: Powder 15, 25 ♣, 30, 40, 120, 240 g/container; oral susp 12.5 g/60 ml, 15 g/72 ml, 15 g/120 ml, 25 g/120 ml, 30 g/120 ml, 50 g/240 ml; 15 g/120 ml ♣, 25 g/125 ml, 50 g/225 ml, 50 g/250 ml

Administer:

- Storage in tightly closed container to prevent absorption of gases
- Use stool softener or laxative to lessen constipation unless sorbitol has been given

PO route

- Give orally to those with intact gag reflexes, protected airways
- After inducing vomiting unless vomiting contraindicated (i.e., cyanide or alkalis)
- After mixing with water or fruit juice to form thick syrup; do not use dairy products, chocolate syrup to mix charcoal

• Repeat dose if vomiting occurs soon after dose; give with a laxative to promote elimination
• After spacing at least 2 hr before or after other products or absorption will be decreased
• Do not use tabs, caps to treat overdose

NG route

• Through nasogastric tube if patient unable to swallow

SIDE EFFECTS

GI: *Nausea, black stools,* vomiting, constipation, diarrhea, abdominal pain
OTHER: Pulmonary aspiration

PHARMACOKINETICS

PO: Excreted in feces, not absorbed, excreted unchanged in feces

INTERACTIONS

• Inactivation of acetylcysteine
Decrease: effects of acarbose, carBAMazepine, digoxin, ipecac, phenytoin, acetaminophen, barbiturates, furosemide, methotrexate, phenothiazine, salicylates, tricyclics; use for overdose

NURSING CONSIDERATIONS

Assess:
• Respiration, pulse, B/P to determine charcoal effectiveness if taken for barbiturate/opiate poisoning; intact gag reflex, serum
• Not used for all types of overdose
Evaluate:
• Therapeutic response: LOC alert (poisoning)
Teach patient/family:
• That stools will be black
• How to prevent further poisonings
• To drink 8 glasses of water to prevent constipation

A

acyclovir (Rx)

(ay-sye'kloe-veer)
Zovirax
Func. class.: Antiviral
Chem. class.: Purine nucleoside analog

Do not confuse:
Zovirax/Zyvox/Valtrex/Zostrix

ACTION: Interferes with DNA synthesis by conversion to acyclovir triphosphate, thereby causing decreased viral replication

USES: Mucocutaneous herpes simplex virus, herpes genitalis (HSV-1, HSV-2), varicella infections, herpes zoster, herpes simplex encephalitis
Unlabeled uses: Bell's palsy, prevention of CMV, Epstein-Barr virus, esophagitis, hairy leukoplakia, prevention of herpes labialis, herpes simplex, herpes simplex ocular prophylaxis, keratoconjunctivitis, pharyngitis, pneumonitis, prevention of postherpetic neuralgia, proctitis, stomatitis, tracheobronchitis, varicella prophylaxis

CONTRAINDICATIONS: Hypersensitivity to this product, valacyclovir
Precautions: Pregnancy (B), breastfeeding, renal/hepatic/neurologic disease, electrolyte imbalance, dehydration, hypersensitivity to famciclovir, ganciclovir, penciclovir, valganciclovir

DOSAGE AND ROUTES

Herpes simplex (recurrent)
• **Adult: PO** 400 mg 3 ×/day for 5 days or 200 mg 5 ×/day × 5 days
• **Adult and child >12 yr: IV INF** 5 mg/kg over 1 hr q8hr × 7 days, use ideal body weight for patients with obesity
• **Infant >3 mo/child <12 yr: IV INF** 10 mg/kg q8hr × 7 day; if HIV infected 5-10 mg/kg q8hr (moderate to severe)

• **Neonate: IV INF** 10 mg/kg q8hr × 10 days, may use higher dose

Genital herpes

• **Adult: PO** 200 mg q4hr (5 ×/day while awake) for 5 days to 6 mo depending on whether initial, recurrent, or chronic; **IV** 5 mg/kg q8hr × 5 days

Genital herpes, initial limited, mucocutaneous HSV in immunocompromised patients, non-life-threatening

• **Adult/child ≥12 yr:** top cover lesions q3hr 6 times/day

Herpes simplex encephalitis

• **Adult: IV** 10 mg/kg over 1 hr q8hr × 10 days

• **Child 3 mo-12 yr: IV** 20 mg/kg q8hr × 10 days

• **Child birth-3 mo: IV** 10 mg/kg q8hr × 10 days

Herpes labialis, recurrent

• **Adult/child ≥12 yr:** top apply cream 5 ×/day for 4 days, start as soon as symptoms appear

Herpes zoster

• **Adult: PO** 800 mg q4hr while awake × 7-10 days; **IV** 10 mg/kg q8hr × 7 days

Herpes zoster (shingles) immunocompromised patients

• **Adult/adolescent: PO** 800 mg q4hr 5×/day for 7-10 days; **IV** 10 mg/kg q8hr × 7 days

• **Child ≥12 yr: IV** 10 mg/kg/dose q8hr × 7 days

• **Infant/child <12 yr: IV** 20 mg/kg/dose q8hr × 7-10 days

Herpes zoster (shingles) immunocompetent

• **Adult: PO** 800 mg q4hr 5×/day × 7-10 days; start within 48-72 hr of rash onset

Varicella (chickenpox) immunocompetent

• **Adult/adolescent/child >40 kg: PO** 800 mg 4×/day × 5 days

• **Child ≥2 yr and ≤40 kg: PO** 20 mg/kg/dose (max 800 mg) 4×/day × 5 days

Mucosal/cutaneous herpes simplex infections in immunosuppressed patients

• **Adult and child >12 yr: IV** 5 mg/kg q8hr × 7 days

• **Infant >3 mo/child <12: IV** 10 mg/kg q8hr × 7 days

Renal dose

• **Adult and child: PO/IV** CCr >50 ml/min 100% dose q8hr, CCr 25-50 ml/min 100% dose q12hr, CCr 10-25 ml/min 100% dose q24hr, CCr 0-10 ml/min 50% dose q24hr

Recurrent ocular herpes, prevention (unlabeled)

• **Adult/child ≥12 yr: PO** 600-800 mg every day × 8-12 mo

CMV prophylaxis (unlabeled)

• **Adult: IV** 500 mg/m^2 q8hr

Herpes simplex in pneumonitis/esophagitis/tracheobronchitis/proctitis/stomatitis/pharyngitis (unlabeled)

• **Adult and adolescent: IV** 5-10 mg/kg q8hr × 2-7 days or **PO** 200 mg q4hr 5×/day × 7-10 days or 400 mg 3-5 ×/day × ≥10 days

• **Child 6 mo-12 yr: IV** 1000 mg/day in 3-5 divided doses × 7-14 days

Herpes simplex prophylaxis for chronic suppression therapy (unlabeled)

• **Adult and adolescent: PO** 400 mg bid up to 12 mo

• **Child: PO,** 800-1000 mg/day in 2-5 divided doses, max 80 mg/kg/day

Available forms: Caps 200 mg; tabs 400, 800 mg; powder for inj 500, 1000 mg; sol for inj 50 mg/ml; oral susp 200 mg/5 ml; ointment/cream 5%

Administer:

PO route

• Do not break, crush, or chew caps

• May give without regard to meals, with 8 oz of water

• Shake susp before use

Intermittent IV INF route

- Increase fluids to 3 L/day to decrease crystalluria; most critical during first 2 hr after IV
- Reconstitute with 10 ml compatible sol/500 mg or 20 mg/1 g of product, conc of 50 mg/ml, shake, further dilute in 50-125 ml compatible sol; use within 12 hr; give over at least 1 hr (constant rate) by inf pump to prevent nephrotoxicity; do not reconstitute with sol containing benzyl alcohol in neonates

Topical route

- Use finger cot or glove to cover all lesions completely, do not get in eye, wash hands after use

Solution compatibilities: D_5W, LR, or NaCl (D_5 0.9% NaCl, 0.9% NaCl) sol

Y-site compatibilities: Alemtuzumab, alfentanil, allopurinol, amikacin, aminophylline, amphotericin B cholesteryl, amphotericin B liposome, ampicillin, anidulafungin, argatroban, atracurium, bivalirudin, buprenorphine, busulfan, butorphanol, calcium chloride/gluconate, CARBOplatin, cefazolin, cefonicid, cefoperazone, cefotaxime, cefoxitin, ceftazidime, ceftizoxime, cefTRIAXone, cefuroxime, cephapirin, chloramphenicol, cholesteryl sulfate complex, cimetidine, clindamycin, dexamethasone sodium phosphate, dimenhyDRINATE, DOXOrubicin, doxycycline, erythromycin, famotidine, filgrastim, fluconazole, gallium, gentamicin, granisetron, heparin, hydrocortisone sodium succinate, hydromorphone, imipenem/cilastatin, LORazepam, magnesium sulfate, melphalan, methylPREDNISolone sodium succinate, metoclopramide, metroNIDAZOLE, multivitamin, nafcillin, oxacillin, paclitaxel, penicillin G potassium, PENTobarbital, perphenazine, piperacillin, potassium chloride, propofol, ranitidine, remifentanil, sodium bicarbonate, tacrolimus, teniposide, theophylline, thiotepa, ticarcillin, tobramycin, trimethoprim-sulfamethoxazole, vancomycin, vasopressin, voriconazole, zidovudine

SIDE EFFECTS

CNS: Tremors, confusion, lethargy, hallucinations, seizures, dizziness, headache, encephalopathic changes
EENT: Gingival hyperplasia
GI: Nausea, vomiting, diarrhea, increased ALT/AST, abdominal pain, glossitis, colitis
GU: Oliguria, proteinuria, hematuria, vaginitis, moniliasis, glomerulonephritis, acute renal failure, changes in menses, polydipsia
HEMA: Thrombotic thrombocytopenia purpura, hemolytic uremic syndrome (immunocompromised patients)
INTEG: Rash, urticaria, pruritus, pain or phlebitis at IV site, unusual sweating, alopecia, Stevens-Johnson syndrome
MS: Joint pain, leg pain, muscle cramps

PHARMACOKINETICS

Distributed widely; crosses placenta; CSF concentrations are 50% plasma; protein binding 9%-33%
PO: Absorbed minimally, onset unknown, peak 1.5-2 hr, terminal half-life 2.5-3.3 hr
IV: Onset immediate, peak immediate, duration unknown, half-life 20 min-3 hr (terminal); metabolized by liver, excreted by kidneys as unchanged product (95%)

INTERACTIONS

Increase: CNS side effects; zidovudine
Increase: levels, toxicity—probenecid
Increase: nephrotoxicity—aminoglycosides
Increase: concentrations of—entecavir, pemetrexed, tenofovir
Decrease: action of—hydantoins, valproic acid
Drug/Lab Test
Increase: BUN, creatinine

NURSING CONSIDERATIONS

Assess:

- Signs of infection, anemia
- **Toxicity:** any patient with compromised renal system because product is

excreted slowly with poor renal system function; toxicity may occur rapidly
• Hepatic, renal studies: AST, ALT; urinalysis, protein, BUN, creatinine, CCr, watch for increasing BUN and serum creatinine or decreased CCr; I&O ratio; report hematuria, oliguria, fatigue, weakness; may indicate **nephrotoxicity;** check for protein in urine during treatment
• Bowel pattern before, during treatment; if severe abdominal pain with bleeding occurs, product should be discontinued
• Skin eruptions: rash, urticaria, itching
• Allergies before treatment, reaction of each medication; place allergies on chart in bright red letters
• Neurologic status with herpes encephalitis

Perform/provide:
• Storage at room temp for up to 12 hr after reconstitution; if refrigerated, sol may show a precipitate that clears at room temp; yellow discoloration does not affect potency
• Adequate intake of fluids (2 L) to prevent deposits in kidneys, more likely to occur with rapid administration or in dehydration

Evaluate:
• Therapeutic response: absence of itching, painful lesions; crusting and healed lesions; decreased symptoms of chickenpox; healing, decreased pain with herpes zoster

Teach patient/family:
• To take as prescribed; if dose is missed, take as soon as remembered up to 1 hr before next dose; do not double dose
• That product may be taken orally before infection occurs; product should be taken when itching or pain occurs, usually before eruptions
• That sexual partners need to be told that patient has herpes because they can become infected; condoms must be worn to prevent reinfections
• Not to touch lesions to avoid spreading infection to new sites
• That product does not cure infection, just controls symptoms and does not prevent infecting others
• That product must be taken in equal intervals around the clock to maintain blood levels for duration of therapy
• To seek dental care during treatment to prevent gingival hyperplasia
• That women with genital herpes are more likely to develop cervical cancer; to keep all gynecologic appointments

TREATMENT OF OVERDOSE: Discontinue product, hemodialysis, resuscitate if needed

adalimumab (Rx)

(add-a-lim'yu-mab)

Humira

Func. class.: Antirheumatic agent (disease modifying), immunomodulator, anti-TNF

Chem. class.: Recombinant human IgG1 monoclonal antibody, DMARD

Do not confuse:
Humira/Humulin/Humalog

ACTION: A form of human IgG1 monoclonal antibody specific for human tumor necrosis factor (TNF); elevated levels of TNF are found in patients with rheumatoid arthritis

USES: Reduction of signs and symptoms and inhibition of progression of structural damage in patients with moderate to severe active rheumatoid arthritis who are ≥18 years of age and who have not responded to other disease-modifying agents, juvenile rheumatoid arthritis (JRA), psoriatic arthritis, Crohn's disease, moderate to severe plaque psoriasis, ankylosing spondylitis, ulcerative colitis

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, CNS

demyelinating disease, lymphoma, CHF, hepatitis B carriers, manitol hypersensitivity, latex allergy, neoplastic disease

Black Box Warning: Active infections, risk of lymphomas/leukemias, TB

DOSAGE AND ROUTES

Rheumatoid arthritis/ankylosing spondylitis/psoriatic arthritis

• **Adult: SUBCUT** 40 mg every other wk or every wk if not combined with methotrexate; **IV** (unlabeled) 0.25-3 mg/kg q2-4wk

Juvenile rheumatoid arthritis

• **Child ≥4 yr/adolescent ≥30 kg: SUBCUT** 40 mg every other wk

• **Child ≥4 yr/adolescent ≥15 kg to <30 kg: SUBCUT** 20 mg every other wk

• **Child ≥4 yr/adolescent <15 kg: SUBCUT** 24 mg/m^2 BSA (up to 40 mg total) every other wk, then 20 mg every other wk

Crohn's disease/ulcerative colitis

• **Adult: SUBCUT** 160 mg given as 4 inj on day 1 or 2 inj each on days 1 and 2, then 80 mg at wk 2 and 40 mg every other wk starting at wk 4

Plaque psoriasis

• **Adult: SUBCUT** 80 mg baseline as 2 inj then 40 mg every other wk starting 1 wk after initial dose × 16 wk

Available form: Inj 40 mg/0.8 ml; 20 mg/0.4 ml (pediatric)

Administer:

SUBCUT route

• Do not admix with other sol or medications; do not use filter; protect from light; give at 45-degree angle using abdomen, thighs; rotate inj sites; discard unused portions

SIDE EFFECTS

CNS: *Headache*
CV: *Hypertension*
EENT: *Sinusitis*
GI: Abdominal pain, nausea, hepatic damage
HEMA: Leukopenia pancytopenia, aplastic anemia, agranulocytopenia
INTEG: *Rash, inj site reaction*
MISC: Flulike symptoms, UTI, back pain, lupus-like syndrome, increased cancer risk, *antibody development to this drug;* risk of infection (TB, invasive fungal infections, other opportunistic infections), may be fatal, Stevens-Johnson syndrome, anaphylaxis
RESP: *URI,* pulmonary fibrosis, bronchitis

PHARMACOKINETICS

Absorption 65%, terminal half-life 2 wk, lower clearance with advancing age (40-75 yr), high RA factor

INTERACTIONS

Increase: serious infections—other TNF blockers, rilonacept

• Do not use with anakinra, serious infections may occur

• Do not give concurrently with vaccines; immunizations should be brought up to date before treatment

Drug/Lab Test

Increase: ALT, cholesterol

NURSING CONSIDERATIONS

Assess:

• **RA:** pain, stiffness, ROM, swelling of joints before, during treatment

• For inj site pain, swelling, redness; usually occur after 2 inj (4-5 days), use cold compress to relieve pain/swelling

Black Box Warning: For infections (fever, flulike symptoms, dyspnea, change in urination, redness/swelling around any wounds), stop treatment if present; some serious infections including sepsis may occur, may be fatal; patients with active infections should not be started on this product

• May reactivate hepatitis B in chronic carriers, may be fatal

Black Box Warning: Latent TB before therapy, treat before starting this product

• **Anaphylaxis, latex allergy:** stop therapy if lupuslike syndrome develops

• **Blood dyscrasias:** CBC, differential periodically

Black Box Warning: For neoplastic disease (lymphomas/leukemia) in children, adolescents, hepatosplenic T-cell lymphoma is more likely in adolescent males with Crohn's disease or ulcerative colitis

Evaluate:
- Therapeutic response: decreased inflammation, pain in joints, decreased joint destruction

Teach patient/family:
- About self-administration if appropriate: inj should be made in thigh, abdomen, upper arm; rotate sites at least 1 inch from old site; do not inject in areas that are bruised, red, hard
- That if medication is not taken when due, inject next dose as soon as remembered and inject next dose as scheduled
- Not to take any live virus vaccines during treatment
- To report signs of infection, allergic reaction, or lupuslike syndrome, immediately

adefovir (Rx)

(add-ee-foh'veer)

Hepsera

Func. class.: Antiviral

Chem. class.: Adenosine monophosphate analog

ACTION: Inhibits hepatitis B virus DNA polymerase by competing with natural substrates and by causing DNA termination after its incorporation into viral DNA; causes viral DNA death

USES: Chronic hepatitis B

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (C), labor, breastfeeding, children, geriatric patients, dialysis, females, obesity, organ transplant

Black Box Warning: Severe renal disease, impaired hepatic function, lactic acidosis, HIV

DOSAGE AND ROUTES

- **Adult/adolescent: PO** 10 mg/day, optimal duration unknown

Renal dose
- **Adult: PO** CCr ≥50 ml/min 10 mg q24hr; CCr 30-49 ml/min 10 mg q48hr; CCr 10-29 ml/min 10 mg q72hr; hemodialysis 10 mg q7days after dialysis

Available forms: Tabs 10 mg

Administer:
- By mouth without regard for food
- Take with full glass of water

SIDE EFFECTS

CNS: *Headache*

GI: *Dyspepsia,* abdominal pain, nausea, vomiting, diarrhea, hepatomegaly, flatulence, pancreatitis

GU: Hematuria, glycosuria, nephrotoxicity, Fanconi syndrome, renal failure

MISC: Fever, rash, weight loss, cough

PHARMACOKINETICS

PO: Rapidly absorbed from GI tract, peak 1¾ hr, excreted by kidneys 45%, terminal half-life 7.48 hr

INTERACTIONS

- Do not use in combination with emtricitabine/tenofovir, emtricitabine/rilpivirine, emtricitabine/efavirenz/tenofovir

Increase: serum conc and possible toxicity—aminoglycosides, memantine, emtricitabine, efavirenz, dofetilide, digoxin, cyclosporine, amiloride, quiNINE, quiNIDine, procainamide, pemetrexed, midodrine, metFORMIN, NSAIDs, vancomycin, trospium, triamterene, tenofovir, tacrolimus, ranitidine, cimetidine, morphine

Black Box Warning: Increase: lactic acidosis, severe hepatomegaly, NNRTIs, NRTIs, antiretroviral protease inhibitors

Drug/Lab Test

Increase: ALT, AST, amylase, creatine kinase

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Nephrotoxicity: increasing CCr, BUN

Black Box Warning: HIV antibody testing before beginning treatment, HIV resistance may occur in chronic hepatitis B patients

Black Box Warning: For lactic acidosis, severe hepatomegaly with stenosis; for use of NNRTIs, NRTIs, antiretroviral protease inhibitors (PIs), lactic acidosis with severe hepatomegaly is more common in females, obese patients, and with prolonged nucleoside use

- Geriatric patients more carefully; may develop renal, cardiac symptoms more rapidly

Black Box Warning: For exacerbations of hepatitis after discontinuing treatment, monitor LFTs, hepatitis B serology

- Pregnancy: If planned or suspected; if pregnant call the Pregnancy Registry 800-258-4263

Perform/provide:

- Storage in cool environment; protect from light

Evaluate:

- Therapeutic response: decreased symptoms of chronic hepatitis B, improving LFTs

Teach patient/family:

- That optimal duration of treatment is unknown, that product is not a cure, that transmission may still occur
- To avoid use with other medications unless approved by prescriber
- To notify prescriber of decreased urinary output
- Not to stop abruptly unless directed, worsening of hepatitis may occur
- To report immediately dyspnea, nausea, vomiting, abdominal pain, weakness, dizziness, cold extremities
- To notify prescriber if pregnancy is planned or suspected, avoid breastfeeding

⚠ HIGH ALERT

A

adenosine (Rx)

(a-den'oh-seen)

Func. class.: Antidysrhythmic

Chem. class.: Endogenous nucleoside

Do not confuse:

adenosine/adeosine phosphate

ACTION: Slows conduction through AV node, can interrupt reentry pathways through AV node, and can restore normal sinus rhythm in patients with paroxysmal supraventricular tachycardia

USES: PSVT, as a diagnostic aid to assess myocardial perfusion defects in CAD, Wolff-Parkinson-White syndrome

Unlabeled uses: Wide-complex tachycardia diagnosis

CONTRAINDICATIONS: Hypersensitivity, 2nd- or 3rd-degree AV block, sick sinus syndrome, atrial flutter, atrial fibrillation, ventricular tachycardia, bronchospastic lung disease, symptomatic bradycardia, bundle branch block, heart transplant, unstable angina

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, asthma

DOSAGE AND ROUTES

Antidysrhythmic

- **Adult and child >50 kg: IV BOL** 6 mg; if conversion to normal sinus rhythm does not occur within 1-2 min, give 12 mg by rapid **IV BOL**; may repeat 12-mg dose again in 1-2 min
- **Infant and child <50 kg: IV BOL** 0.1 mg/kg; if not effective, increase dose by 0.05-0.1 mg/kg q2min to a max of 0.3 mg/kg/dose
- **Neonate: IV BOL** 0.05 mg/kg by rapid IV BOL, may increase by 0.05 mg/kg q2min, max 0.3 mg/kg/dose

Available forms: 3 mg/ml

Administer:

• Warm to room temp; crystals will dissolve

IV, direct route

• Undiluted; give 6 mg or less by rapid inj over 1-2 sec; if using an IV line, use port near insertion site, flush with NS (20 ml), then elevate arm

Y-site compatibilities: abciximab
Solution compatibilities: D_5LR, D_5W, LR, 0.9% NaCl

SIDE EFFECTS

CNS: Lightheadedness, dizziness, arm tingling, numbness, headache
CV: Chest pain, pressure, atrial tachydysrhythmias, sweating, palpitations, hypotension, *facial flushing,* AV block, cardiac arrest, ventricular dysrhythmias
GI: *Nausea,* metallic taste
RESP: *Dyspnea, chest pressure,* hyperventilation, bronchospasm (asthmatics)

PHARMACOKINETICS

Cleared from plasma in <30 sec, half-life 10 sec, converted to inosine/adenosine monophosphate

INTERACTIONS

Increase: risk for higher degree of heart block—carBAMazepine
Increase: risk for ventricular fibrillation—digoxin, verapamil
• Smoking: increase tachycardia
Increase: effects of adenosine—dipyridamole
Decrease: activity of adenosine—theophylline or other methylxanthines (caffeine)

Drug/Herb

Increase: adenosine effect—ginger
Decrease: adenosine effect—guarana, green tea

NURSING CONSIDERATIONS

Assess:

• **Cardiopulmonary status:** B/P, pulse, respiration, rhythm, ECG intervals (PR, QRS, QT); check for transient dysrhythmias (PVCs, PACs, sinus tachycardia, AV block)
• Respiratory status: rate, rhythm, lung fields for crackles, watch for respiratory depression; bilateral crackles may occur in **CHF** patient; increased respiration, increased pulse, product should be discontinued
• CNS effects: dizziness, confusion, psychosis, paresthesias, seizures; product should be discontinued

Perform/provide:

• Storage at room temperature; sol should be clear; discard unused product

Evaluate:

• Therapeutic response: normal sinus rhythm or diagnosis of perfusion defect

Teach patient/family:

• To report facial flushing, dizziness, sweating, palpitations, chest pain; usually transient

TREATMENT OF OVERDOSE:

Defibrillation, vasopressor for hypotension, theophylline

aflibercept

(a-fli-ber'sept)

EYLEA

Func. class.: Biologic response modifier; signal transduction inhibitor (STIs) (Ophthalmic)

ACTION: A recombinant fusion protein consisting of portions of human VEGF receptors 1 and 2 extracellular domains fused to human IgG1; acts as a soluble decoy receptor that binds vascular endothelial growth factor-A (VEGF-A) and placental growth factor (PlGF); can act as mitogenic, chemotactic, vascular permeability factors for endothelial cells; VEGF-A interacts with VEGFR-1 and VEGFR-2 on the surface of endothelial cells; results in neovascularization and vascular permeability; binding of aflibercept to VEGF-A and PlGF prevents activation of these receptors

USES: For treatment of neovascular (wet) age-related macular degeneration (AMD), macular edema after central retinal vein

CONTRAINDICATIONS

Hypersensitivity, ocular/periocular infection, active intraocular inflammation

Precautions: Neonates, infants, children, adolescents, pregnancy (C), breastfeeding; history of glaucoma, ocular surgery; driving or operating machinery

DOSAGE AND ROUTES

• **Adult: Intravitreal INJ** 2 mg (0.05 ml) into affected eye(s) q4wk × 12 wk, then 2 mg (0.05 ml) q8wk

Available forms: Solution for injection 2 mg/0.05 ml

Administer:

Intravitreal route

• Visually inspect for particulate matter, discoloration before use; do not use if particulates, cloudiness, discoloration are visible; only for use by physicians trained in administration

• Use controlled aseptic conditions (sterile gloves, sterile drape, sterile eyelid speculum); adequate anesthesia, topical broad-spectrum antiinfective should be given before use

• Use each vial for treatment of single eye only; if other eye is being treated, use new vial and change the sterile field, syringe, gloves, drapes, eyelid speculum, filter, injection needles before administering to the other eye

• Use aseptic technique, withdraw all of vial contents through a 5-micron 19-G filter needle attached to 1-ml syringe supplied by manufacturer; after vial contents are withdrawn, discard filter needle and replace with sterile 30-G × ½ inch needle for intravitreal injection; expel any air bubbles and contents of syringe until plunger tip is aligned with line that marks 0.05 ml

• Immediately after the intravitreal injection, monitor patient for elevation in intraocular pressure (IOP); appropriate monitoring may consist of a check for perfusion of optic nerve head or tonometry; sterile paracentesis needle should be available if required

SIDE EFFECTS

CV: **Thromboembolism, nonfatal stroke, nonfatal myocardial infarction, vascular death**

EENT: *Ocular hemorrhage, ocular pain, cataracts, vitreous detachment, vitreous floaters,* conjunctival hyperemia, corneal erosion, detachment of retinal pigment epithelium, injection site pain, foreign body sensation, increased lacrimation, blurred vision, retinal pigment epithelium tear, injection site hemorrhage, blepharedema, corneal edema

SYST: Hypersensitivity

PHARMACOKINETICS

Absorbed into systemic circulation; present in its unbound form and stable inactive form bound with endogenous VEGF; elimination by binding to free endogenous VEGF; metabolism by proteolysis; terminal half-life in plasma 5-6 days

NURSING CONSIDERATIONS

Assess:

• **Infection:** monitor for infection during week after injection to permit early treatment of any ocular infection that may develop; proper aseptic injection technique should be used to minimize infection

• **Increased intraocular pressure:** monitor for acute increases in intraocular pressure within 60 min of injection; sustained increases in intraocular pressure have been reported after repeated intravitreal dosing; monitor intraocular pressure and optic nerve head perfusion, a sterile paracentesis needle should be available

Perform/provide:

• Storage: do not freeze, protect from light, refrigerate, store in original package until time of use

Evaluate:
• Prevention of further vision loss
Teach patient/family:
⚠ To seek immediate care if symptoms of endophthalmitis or retinal detachment develop (ocular pain, hyperemia of the conjunctiva, photophobia, blurry vision)

albumin, human 5% (Rx)

(al-byoo'min)
Albumarc, Albuminar-5, Albutein 5%, Buminate 5%, Plasbumin-5

albumin, human 25%

Albuminar-25, Albutein 25%, Buminate 25%, Plasbumin-25
Func. class.: Plasma volume expander

ACTION: Exerts oncotic pressure, which expands volume of circulating blood and maintains cardiac output

USES: Restores plasma volume after burns, hyperbilirubinemia, shock, hypoproteinemia, prevention of cerebral edema, cardiopulmonary bypass procedures, ARDS, nephrotic syndrome

CONTRAINDICATIONS: Hypersensitivity, CHF, severe anemia, renal insufficiency, pulmonary edema
Precautions: Pregnancy (C), decreased salt intake, decreased cardiac reserve, lack of albumin deficiency, renal/hepatic disease, chronic anemia

DOSAGE AND ROUTES

Burns
• **Adult: IV** dose to maintain plasma albumin at 3-4 mg/dl
Hypovolemic Shock
• **Adult: IV** rapidly give 5% sol, when close to normal inf at ≤2-4 ml/min (25% sol ≤1 ml/min)
• **Child: IV** 0.5-1 g/kg/dose 5% sol, may repeat as needed, max 6 g/kg/day
Nephrotic Syndrome
• **Adult: IV** 100-200 ml of 25% and loop diuretic × 7-10 days
Hypoproteinemia
• **Adult: IV** 25 g, may repeat in 15-30 min, or 50-75 g of 25% albumin infused at ≤2 ml/min
• **Child and infant: IV** 0.5-1 g/kg/dose over 2-4 hr, may repeat q1-2days
Hyperbilirubinemia/erythroblastosis fetalis
• **Infant: IV** 1 g/kg 1-2 hr before transfusion
Available forms: Inj (5%) 50 mg/ml, (25%) 250 mg/ml
Administer:
IV route
• Slowly, to prevent fluid overload; dilute with NS for injection or D_5W; 5% is given undiluted; 25% may be given diluted or undiluted; give over 30-60 min, use inf pump, use large-gauge needle; inf must be completed within 4 hr
• 5% solution may be used with hypovolemic/intravascular depletion
• 25% solution may be used with sodium/fluid restrictions

Solution compatibilities: LR, NaCl, Ringer's, D_5W, $D_{10}W$, $D_{2^1/_2}W$, NaCl 0.9%, dextrose/Ringer's, dextrose/LR
Y-site compatibilities: Diltiazem, LORazepam

SIDE EFFECTS

CNS: Fever, chills, flushing, headache
CV: Fluid overload, hypotension, erratic pulse, tachycardia
GI: Nausea, vomiting, increased salivation
INTEG: Rash, urticaria
RESP: Altered respirations, pulmonary edema

PHARMACOKINETICS

In hyponutrition states, metabolized as protein/energy source; terminal half-life 21 days

INTERACTIONS

Drug/Lab Test

Increase: serum albumin

NURSING CONSIDERATIONS

Assess:

- Blood studies Hct, Hgb; if serum protein declines, dyspnea, hypoxemia can result
- Decreased B/P, erratic pulse, respiration
- I&O ratio: urinary output may decrease
- ⚠ **Circulatory/pulmonary overload:** CVP, pulmonary wedge pressure distended neck veins indicate circulatory overload; shortness of breath, anxiety, insomnia, expiratory crackles, frothy blood-tinged cough, cyanosis indicate pulmonary overload
- **Allergy:** fever, rash, itching, chills, flushing, urticaria, nausea, vomiting, hypotension, requires discontinuation of inf, use of new lot if therapy reinstituted; premedicate with diphenhydrAMINE

Perform/provide:

- Adequate hydration before, during administration
- Check type of albumin; some stored at room temp, some need to be refrigerated, use within 4 hr of opening

Evaluate:

- Therapeutic response: increased B/P, decreased edema, increased serum albumin levels, increased plasma protein

Teach patient/family:

- Reason for product; to report hypersensitivity

albuterol (Rx)

(al-byoo'ter-ole)

Accuneb, Airomir ♣, Apo-Salvent, Gen-Salbutamol ♣, Proair HFA, Proventil, Proventil HFA, ReliOn, Ventolin HFA, VoSpire ER

Func. class.: Adrenergic β_2-agonist, sympathomimetic, bronchodilator

Do not confuse:

albuterol/atenolol/Albutein

Ventolin/Vantin

Proventil/Prinivil

ACTION: Causes bronchodilation by action on β_2 (pulmonary) receptors by increasing levels of cAMP, which relaxes smooth muscle; produces bronchodilation, CNS, cardiac stimulation as well as increased diuresis and gastric acid secretion; longer acting than isoproterenol

USES: Prevention of exercise-induced asthma, acute bronchospasm, bronchitis, emphysema, bronchiectasis, or other reversible airway obstruction

Unlabeled uses: Hyperkalemia in dialysis patients

CONTRAINDICATIONS: Hypersensitivity to sympathomimetics, tachydysrhythmias, severe cardiac disease, heart block

Precautions: Pregnancy (C), breast-feeding, cardiac/renal disease, hyperthyroidism, diabetes mellitus, hypertension, prostatic hypertrophy, angle-closure glaucoma, seizures, exercise-induced bronchospasm (aerosol) in children <12 yr, hypoglycemia

DOSAGE AND ROUTES

Bronchospasm prophylaxis

- **Adult and child ≥4 yr: INH** (metered-dose inhaler) 2 puffs q4-6hr as needed

Other respiratory conditions

• **Adult and child ≥12 yr: INH** (metered-dose inhaler) 1 puff q4-6hr; **PO** 2-4 mg tid-qid, max 32 mg; **NEB/IPPB** 2.5 mg tid-qid

• **Geriatric: PO** 2 mg tid-qid, may increase gradually to 8 mg tid-qid

• **Child 2-12 yr: INH** (metered-dose inhaler) 0.1 mg/kg tid (max 2.5 mg tid-qid); **NEB/IPPB** 0.1-0.15 mg/kg/dose tid-qid or 1.25 mg tid-qid for child 10-15 kg or 2.5 mg tid-qid for child >15 kg

Hyperkalemia (unlabeled)

• **Adult: ORAL INH** (albuterol nebulizer sol) 10-20 mg

Available forms: Aerosol 90 mcg/actuation; oral syr 2 mg/5 ml; tabs 2, 4 mg; ext rel 4, 8 mg; INH sol 0.5, 0.83, 1, 2, 5 mg/ml; powder for INH (Ventodisk) 200, 400 mcg; INH cap 200 mcg; 100 mcg/spray, 80 INH/canister, 200 INH/canister

Administer:

PO route

• Do not break, crush, or chew ext rel tabs; give with meals to decrease gastric irritation

• **Oral sol** to children (no alcohol, sugar)

Inhalation route

• For geriatric patients and children, a spacing device is advised

• After shaking metered-dose inhaler, exhale, place mouthpiece in mouth, inhale slowly while depressing inhaler, hold breath, remove, exhale slowly; give INH at least 1 min apart

• **NEB/IPPB** diluting 5 mg/ml sol/2.5 ml 0.9% NaCl for INH; other sol do not require dilution; for neb O_2 flow or compressed air 6-10 L/min

SIDE EFFECTS

CNS: *Tremors, anxiety,* insomnia, headache, dizziness, stimulation, *restlessness,* hallucinations, flushing, irritability

CV: Palpitations, tachycardia, angina, hypo/hypertension, dysrhythmias

EENT: Dry nose, irritation of nose and throat

GI: Heartburn, nausea, vomiting

MISC: Flushing, sweating, anorexia, bad taste/smell changes, hypokalemia, metabolic acidosis

MS: Muscle cramps

RESP: Cough, wheezing, dyspnea, paradoxical bronchospasm, dry throat

PHARMACOKINETICS

Extensively metabolized in the liver and tissues, crosses placenta, breast milk, blood-brain barrier

PO: Onset ½ hr, peak 2-3 hr, duration 4-6 hr, half-life 2.7-6 hr, well absorbed

PO-ER: Onset ½ hr; peak 2-3 hr; duration 8-12 hr

INH: Onset 5-15 min, peak 1-1½ hr, duration 3-6 hr, half-life 4 hr

INTERACTIONS

Increase: QTc prolongation—other drugs that increase QT prolongation

Increase: digoxin level—digoxin

Increase: CNS stimulation—CNS stimulants

Increase: ECG changes/hypokalemia—potassium-losing diuretics

Increase: severe hypotension—oxytocics

Increase: toxicity—theophylline

Increase: action of aerosol bronchodilators

Increase: action of albuterol—tricyclics, MAOIs, other adrenergics; do not use together

Increase: CV effects—atomoxetine, selegiline

Decrease: albuterol—other β-blockers

Drug/Herb

Increase: stimulation—caffeine (cola nut, green/black tea, guarana, yerba maté, coffee, chocolate)

Drug/Lab Test

Decrease: potassium

NURSING CONSIDERATIONS

Assess:

• **Respiratory function:** vital capacity, forced expiratory volume, ABGs; lung sounds, heart rate and rhythm, B/P, sputum (baseline and peak); whether pa-

tient has not received theophylline therapy before giving dose
- Patient's ability to self-medicate
- For evidence of allergic reactions
- For paradoxical bronchospasm; hold medication, notify prescriber if bronchospasm occurs

Perform/provide:
- Storage in light-resistant container; do not expose to temperatures of more than 86° F (30° C)

Evaluate:
- Therapeutic response: absence of dyspnea, wheezing after 1 hr, improved airway exchange, improved ABGs

Teach patient/family:
- To use exactly as prescribed; to take missed dose when remembered, alter dosing schedule; not to use OTC medications; that excess stimulation may occur
- About use of inhaler: review package insert with patient; use demonstration; return demonstration; shake, prime before 1st use and when not used for >2 wk; release 4 test sprays into air, away from the face
- To avoid getting aerosol in eyes (blurring of vision may result) or using near flames or sources of heat
- To wash inhaler in warm water daily and dry; to track number of inhalations used and to discard product when labeled inhalations have been used
- To avoid smoking, smoke-filled rooms, persons with respiratory infections

⚠ That **paradoxical bronchospasm** may occur; to stop product immediately, call prescriber
- To limit caffeine products such as chocolate, coffee, tea, colas

TREATMENT OF OVERDOSE:
Administer β_1-adrenergic blocker, IV fluids

A

alendronate (Rx)
(al-en-drone'ate)
Binosto, Fosamax, Fosamax plus D
Func. class.: Bone-resorption inhibitor
Chem. class.: Bisphosphonate

Do not confuse:
Fosamax/Flomax

ACTION: Decreases rate of bone resorption and may directly block dissolution of hydroxyapatite crystals of bone, inhibits osteoclast activity

USES: Treatment and prevention of osteoporosis in postmenopausal women, treatment of osteoporosis in men, Paget's disease, treatment of corticosteroid-induced osteoporosis in postmenopausal women not receiving estrogen and in men who are on continuing corticosteroid treatment with low bone mass

CONTRAINDICATIONS: Hypersensitivity to bisphosphonates, delayed esophageal emptying, inability to sit or stand for 30 min, hypocalcemia
Precautions: Pregnancy (C), breast-feeding, children, CCr <35 ml/min, esophageal disease, ulcers, gastritis, poor dental health, increased esophageal cancer risk

DOSAGE AND ROUTES
Osteoporosis in postmenopausal women
- **Adult and geriatric: PO** 10 mg/day or 70 mg/wk

Osteoporosis in men
- **Adult: PO** 10 mg/day or 70 mg/wk

Paget's disease
- **Adult and geriatric: PO** 40 mg/day × 6 mo, consider retreatment for relapse

Prevention of osteoporosis
- **Adult/postmenopausal female: PO** 5 mg/day or 35 mg/wk

Corticosteroid-induced osteoporosis in postmenopausal women (not receiving estrogen)
• **Adult: PO** 10 mg/day
Corticosteroid-induced osteoporosis in men or premenopausal women
• **Adult: PO** 5 mg/day
Renal dose
• **Adult: PO** CCr ≤35 ml/min, not recommended
Available forms: Tabs 5, 10, 35, 40, 70 mg; tabs 70 mg with 2800 IU vit D_3, 70 mg with 5600 IU Vit D_3; oral sol 70 mg/75 ml, effervescent tab 70 mg
Administer:
• For 6 months to be effective for Paget's disease
• **Tablet:** take with 8 oz of water 30 min before 1st food, beverage, or medication of the day
• Do not lie down for ≥30 min after dose, do not take at bedtime or before rising
• **Liquid:** use oral syringe or calibrated device; give in AM with ≥2 oz of water ≥30 min before food, beverage, or medication

SIDE EFFECTS

CNS: Headache
GI: Abdominal pain, constipation, nausea, vomiting, esophageal ulceration, acid reflux, dyspepsia, esophageal perforation, diarrhea, esophageal cancer
META: Hypophosphatemia, hypocalcemia
MS: Bone pain, osteonecrosis of the jaw, bone fractures
SYST: Angioedema, Stevens-Johnson syndrome, toxic epidermal necrolysis

PHARMACOKINETICS

Bioavailability 60%, protein binding 78%, rapidly cleared from circulation, taken up mainly by bones, eliminated primarily through kidneys; bound to bone, half-life >10 yr

INTERACTIONS

Increase: GI adverse reactions—NSAIDs, salicylates, H_2 blockers, proton pump inhibitors, gastric mucosal agents
Decrease: absorption—antacids, calcium supplements, aminoglycosides
Drug/Food
Decrease: absorption when used with caffeine, orange juice, food
Drug/Lab Test
Decrease: calcium, phosphate

NURSING CONSIDERATIONS

Assess:
⚠ Serious reactions: angioedema, Stevens-Johnson syndrome, toxic epidermal necrolysis, atrial fibrillation
• Hormonal status if a woman, before treatment
• **For osteoporosis:** bone density test before and during treatment
• **For Paget's disease:** increased skull size, bone pain, headache; decreased vision, hearing
• Electrolytes; BUN/creatinine; calcium, phosphorous, magnesium, potassium
• **For hypercalcemia:** paresthesia, twitching, laryngospasm; Chvostek's, Trousseau's signs
• Alk phos levels, baseline and periodically, 2 × upper limit of normal is indicative of Paget's disease
• Dental status: regular dental exams should be performed; dental extractions (cover with antiinfectives before procedure)
Perform/provide:
• Storage in cool environment, out of direct sunlight
Evaluate:
• Therapeutic response: increased bone mass, absence of fractures
Teach patient/family:
• To remain upright for 30 min after dose to prevent esophageal irritation; if dose is missed, skip dose, do not double doses or take later in day; to take in AM before food, other meds; to take with 6-8 oz of water only (no mineral water)
• To take calcium, vit D if instructed by health care provider

- To perform weight-bearing exercise to increase bone density
- To let health care provider know if pregnant or if pregnancy is planned or if breastfeeding; to inform dentist of the use of this product
- To maintain good oral hygiene

alfuzosin (Rx)

(al-fyoo'zoe-sin)

Uroxatral

Func. class.: Urinary tract, antispasmodic, α_1-agonist

Chem. class.: Quinazolone

ACTION: Binds to α_{1A}-adrenoceptor subtype located mainly in the prostate, relaxing smooth muscles

USES: Symptoms of benign prostatic hyperplasia

Unlabeled uses: Lower urinary tract symptoms, erectile dysfunction with sildenafil

CONTRAINDICATIONS: Hypersensitivity, moderate to severe hepatic impairment; not indicated for use in women or children, breastfeeding

Precautions: Pregnancy (B) but not used in females, geriatric patients; CAD, coronary insufficiency, mild hepatic disease, mild/moderate/severe renal disease, history of QT prolongation or coadministration with meds known to prolong QT interval, torsades de pointes, syncope, surgery, prostate cancer, orthostatic hypotension, ocular surgery, dysrhythmias, angina

DOSAGE AND ROUTES

- **Adult: PO EXT REL** 10 mg/day, taken after same meal each day

Available forms: Ext rel tabs 10 mg

Administer:

PO route

- Do not break, crush, chew tabs; give with food; take at same time each day

SIDE EFFECTS

CNS: *Dizziness, headache,* fatigue, flushing

CV: Postural hypotension (dizziness, lightheadedness, fainting) within a few hours of administration, chest pain, tachycardia, angina

GI: Nausea, abdominal pain, dyspepsia, constipation, diarrhea, liver injury, jaundice

INTEG: Rash, urticaria, angioedema, pruritus

GU: Impotence, priapism

MISC: Body pain in general, xerostomia, rhinitis

RESP: Upper respiratory infection, pharyngitis, bronchitis, sinusitis

PHARMACOKINETICS

Peak 8 hr, elimination half-life 10 hr, extensively metabolized in liver by CYP3A4 enzyme, excreted via urine (11% unchanged), moderately protein binding (82%-90%)

INTERACTIONS

- Not to be taken with prazosin, terazosin, doxazosin

Increase: QT prolongation (slight)—class IA/III antidysrhythmics

Increase: effects of alfuzosin—alcohol

Increase: effects—CYP3A4 inhibitors (ketoconazole, itraconazole, and ritonavir); do not use together

Increase: hypotension—β-blockers, phosphodiesterase 5 inhibitors, nitrates

NURSING CONSIDERATIONS

Assess:

- **Prostatic hyperplasia:** change in urinary patterns (hesitancy, dribbling, dysuria, urgency), baseline and throughout treatment
- **Serious skin reactions:** angioedema

Perform/provide:

- Storage in tight container in cool environment

Evaluate:

- Therapeutic response: decreased

symptoms of benign prostatic hyperplasia

Teach patient/family:

- To take at same time each day with food; to not double doses
- Not to drive or operate machinery for 4 hr after 1st dose or after dosage increase, dizziness may occur
- About orthostatic hypotension; to rise slowly from sitting or lying
- To avoid all OTC products unless approved by prescriber
- To notify prescriber of fainting, dizziness
- That erectile dysfunction is a side effect and is temporary

aliskiren (Rx)

(a-lis'kir-en)

Tekturna

Func. class.: Antihypertensive

Chem. class.: Direct renin inhibitor

ACTION: Renin inhibitor that acts on the renin-angiotensin system (RAS)

USES: Hypertension, alone or in combination with other antihypertensives

CONTRAINDICATIONS: Hypersensitivity

Black Box Warning: Pregnancy (D) 2nd, 3rd trimester

Precautions: Pregnancy (C) 1st trimester, breastfeeding, children, geriatric patients, angioedema, aortic/renal artery stenosis, cirrhosis, CAD, dialysis, hyper/hypokalemia, hyponatremia, hypotension, hypovolemia, renal/hepatic disease, surgery, diabetes, seizures

DOSAGE AND ROUTES

- **Adult: PO** 150 mg/day, may increase to 300 mg/day if needed, max 300 mg/day

Available forms: Tabs 150, 300 mg

Administer:

- Do not use with a high-fat meal
- Daily with a full glass of water, titrate up to achieve correct dose
- Do not discontinue abruptly, correct electrolyte/volume depletion before treatment

SIDE EFFECTS

CV: Orthostatic hypotension, hypotension

CNS: Headache, dizziness

GI: Diarrhea

GU: Renal stones, increased uric acid

INTEG: Rash

META: Hyperkalemia

MISC: Angioedema, cough

PHARMACOKINETICS

Poorly absorbed, bioavailability 2.3%, peak 1-3 hr, steady state 7-8 days, 91% excreted unchanged in the feces, half-life 24 hr

INTERACTIONS

- Do not use ACE inhibitors, angiotensin II receptor antagonists in diabetes mellitus

Increase: potassium levels—ACE inhibitors, angiotensin II receptor antagonists, potassium supplements, potassium-sparing diuretics

Increase: hypotension—other antihypertensives, diuretics

Increase: aliskiren levels—atorvastatin, itraconazole, ketoconazole, cyclosporine; concurrent use is not recommended

Decrease: levels of warfarin

Drug/Food

Decrease: absorption—high-fat meal

Drug/Lab Test

Increase: uric acid, CPK, BUN, serum creatinine, potassium

Decrease: Hct, Hgb

NURSING CONSIDERATIONS

Assess:

- Renal studies: uric acid, serum creatinine, BUN may be increased; potassium, hyperkalemia may occur

Allergic reactions: angioedema may occur (swelling of face; trouble breathing, swallowing)

- Daily dependent edema in feet, legs; weight, B/P, orthostatic hypotension
- **Diabetes:** identify the use of ACE inhibitors, angiotensin II receptor antagonists, do not use aliskiren

Perform/provide:

- Storage in tight container at room temp

Evaluate:

- Therapeutic response: decrease in B/P

Teach patient/family:

- About the importance of complying with dosage schedule even if feeling better; that if dose is missed, take as soon as possible; that if it is almost time for the next dose, take only that dose; do not double dose

Black Box Warning: To notify if pregnancy is planned or suspected; if pregnant, product will need to be discontinued, pregnancy (D) 2nd/3rd trimester, (C) 1st trimester

- How to take B/P and normal reading for age group
- Not to use OTC products including herbs, supplements unless approved by prescriber
- To report to prescriber immediately: dizziness, faintness, chest pain, palpitations, uneven or rapid heart beat, headache, severe diarrhea, swelling of tongue or lips, trouble breathing, difficulty swallowing, tightening of the throat
- Not to operate machinery or perform hazardous tasks if dizziness occurs
- To avoid faintness; to rise slowly

A

allopurinol (Rx)

(al-oh-pure'i-nole)

Aloprim, Zyloprim

Func. class.: Antigout drug, antihyperuricemic

Chem. class.: Xanthene oxidase inhibitor

Do not confuse:
Zyloprim/Zovirax

ACTION: Inhibits the enzyme xanthine oxidase, reducing uric acid synthesis

USES: Chronic gout, hyperuricemia associated with malignancies, recurrent calcium oxalate calculi, uric acid calculi

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (C), breastfeeding, children, renal/hepatic disease

DOSAGE AND ROUTES

Increased uric acid levels in malignancies

- **Adult: PO** 600-800 mg/day in divided doses for 2-3 days; start up to 1-2 days before chemotherapy; **IV INF** 200-400 mg/m^2/day, max 600 mg/day 24-48 hr before chemotherapy, may be divided at 6-, 8-, 12-hr intervals
- **Child 6-10 yr: PO** 300 mg/day, adjust dose after 48 hr
- **Child <6 yr: PO** 150 mg/day, adjust dose after 48 hr
- **Child: IV INF** 200 mg/m^2/day, initially as a single dose or divided q6-12hr

Recurrent calculi

- **Adult: PO** 200-300 mg/day in a single dose or divided bid-tid, max 300 mg/dose, 800 mg/day

Uric acid nephropathy prevention

- **Adult and child >10 yr: PO** 600-800 mg/day × 2-3 days

Gout (mild)

- **Adult: PO** 100 mg/day, increase weekly based on uric acid levels, max 800 mg/

day; maintenance dose 100-200 mg bid-tid

Gout (moderate-severe)

• **Adult: PO** 400-600 mg/day in a single dose or divided bid-tid, max 800 mg/day, doses >300 mg should be given in divided doses

Renal dose

• **Adult: PO/IV** CCr 81-100 ml/min 300 mg/day; CCr 61-80 ml/min 250 mg/day; CCr 41-60 ml/min 200 mg/day; 21-40 ml/min 150 mg/day; CCr 10-20 ml/min 100-200 mg/day; CCr 3-9 ml/min 100 mg/day or 100 mg every other day; CCr <3 ml/min 100 mg q24hr or longer or 100 mg every 3rd day

Available forms: Tabs, scored 100, 300 mg; powder for inj 500 mg/vial

Administer:

PO route

• With meals to prevent GI symptoms; may crush, add to foods or fluids

• 1-2 days before antineoplastic therapy

Intermittent IV INF route

• Reconstitute 30-ml vial with 25 ml of sterile water for inj; dilute to desired conc (≤6 mg/ml) with 0.9% NaCl for inj or D_5 for inj; begin inf within 10 hr

Y-site compatibilities: Acyclovir, aminophylline, amphotericin B lipid complex, anidulafungin, argatroban, atenolol, aztreonam, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium gluconate, CARBOplatin, caspofungin, ceFAZolin, cefoperazone, cefotetan, ceftAZidime, ceftizoxime, ceftRIAXone, cefuroxime, CISplatin, cyclophosphamide, DACTINomycin, DAUNOrubicin citrate liposome, dexamethasone, dexmedetomidine, docetaxel, DOXOrubicin liposomal, enalaprilat, etoposide, famotidine, fenoldopam, filgrastim, fluconazole, fludarabine, fluorouracil, furosemide, gallium, ganciclovir, gatifloxacin, gemcitabine, gemtuzumab, granisetron hydrochloride, heparin, hydrocortisone phosphate, hydrocortisone succinate, HYDROmorphone, ifosfamide, linezolid injection, LORazepam, mannitol, mesna, methotrexate, metroNIDAZOLE, milrinone, mitoxantrone, morphine, nesiritide, octreotide, oxytocin, PACLitaxel, pamidronate, pantoprazole, pemetrexed, piperacillin, piperacillin-tazobactam, plicamycin, potassium chloride, ranitidine, sodium acetate, sulfamethoxazole-trimethoprim, teniposide, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, vancomycin, vasopressin, vinBLAStine, vinCRIStine, voriconazole, zidovudine, zoledronic acid

SIDE EFFECTS

CNS: *Headache,* drowsiness, neuritis, paresthesia

GI: *Nausea, vomiting, anorexia, malaise,* metallic taste, cramps, peptic ulcer, diarrhea

HEMA: Agranulocytosis, thrombocytopenia, aplastic anemia, pancytopenia, leukopenia, bone marrow suppression, eosinophilia

INTEG: Dermatitis, pruritus, purpura, erythema, rash, Stevens-Johnson syndrome

MISC: Myopathy, arthralgia, hepatomegaly, cholestatic jaundice, renal failure, exfoliative dermatitis

PHARMACOKINETICS

Protein binding <1%, half-life 1-2 hr

PO: Peak 1.5 hr; excreted in feces, urine

IV: Peak up to 30 min

INTERACTIONS

Increase: kidney stone formation—ammonium chloride, vit C, potassium/sodium phosphate

Increase: rash—ampicillin, amoxicillin, avoid concurrent use

Increase: action of oral anticoagulants, oral antidiabetics, theophylline

Increase: hypersensitivity, toxicity—ACE inhibitors, thiazides

Increase: bone marrow depression—antineoplastics (mercaptopurine, azaTHIOprine)

Increase: xanthine nephropathy, calculi—rasburicase

NURSING CONSIDERATIONS

Assess:

- **For gout:** joint pain, swelling; may use with NSAIDs for acute gouty attacks; uric acid levels q2wk; uric acid levels should be ≤6 mg/dl, effect may take several wk
- CBC, AST, BUN, creatinine before starting treatment, periodically
- I&O ratio; increase fluids to 2 L/day to prevent stone formation and toxicity
- For rash, hypersensitivity reactions, discontinue allopurinol

Evaluate:

- Therapeutic response: decreased pain in joints, decreased stone formation in kidneys, decreased uric acid levels

Teach patient/family:

- To take as prescribed; if dose is missed, take as soon as remembered; do not double dose; tabs may be crushed
- To increase fluid intake to 2 L/day
- To report skin rash, stomatitis, malaise, fever, aching; product should be discontinued
- To avoid hazardous activities if drowsiness or dizziness occurs
- To avoid alcohol, caffeine; will increase uric acid levels
- To avoid large doses of vit C; kidney stone formation may occur
- To reduce dairy products, refined sugars, sodium, meat if taking for calcium oxalate stones

almotriptan (Rx)

(al-moh-trip'tan)

Axert

Func. class.: Antimigraine agent, abortive

Chem. class.: 5-HT_1-receptor agonist, triptan

Do not confuse:
Axert/Antivert

ACTION: Binds selectively to the vascular 5-$HT_{1B/1D/1F}$-receptors, exerts antimigraine effect

USES: Acute treatment of migraine with or without aura (adult/adolescent/child ≥12 yr) A

CONTRAINDICATIONS: Hypersensitivity, acute MI, angina, CV disease, CAD, stroke, vasospastic angina, ischemic heart disease or risk for, peripheral vascular syndrome, uncontrolled hypertension, basilar or hemiplegic migraine

Precautions: Pregnancy (C), postmenopausal women, men >40 yr, breastfeeding, children <18 yr, geriatric patients, risk factors for CAD, MI; hypercholesterolemia, obesity, diabetes, impaired renal/hepatic function, sulfonamide hypersensitivity, cardiac dysrhythmias, Raynaud's disease, tobacco smoking, Wolff-Parkinson-White syndrome

DOSAGE AND ROUTES

- **Adult, adolescent, and child ≥12 yr:** **PO** 6.25-12.5 mg; may repeat dose after 2 hr; max 2 doses/24 hr, 25 mg/day or 4 treatment cycles within any 30-day period

Hepatic/renal dose CCr 10-30 ml/min

- **Adult: PO** 6.25 mg initially, max 12.5 mg

Available forms: Tabs 6.25, 12.5 mg

Administer:

- Avoid using more than 2 ×/wk; rebound headache may occur
- Swallow tabs whole; do not break, crush, chew, without regard to food

SIDE EFFECTS

CNS: *Tingling, hot sensation, burning, feeling of pressure, tightness, numbness, dizziness, sedation,* headache, anxiety, fatigue, cold sensation, **seizures**

CV: *Flushing,* palpitations, tachycardia, **coronary artery vasospasm, MI, ventricular fibrillation, ventricular tachycardia**

EENT: Throat, mouth, nasal discomfort; vision changes

GI: Nausea, xerostomia

INTEG: Sweating

MS: *Weakness, neck stiffness,* myalgia
RESP: Chest tightness, pressure

PHARMACOKINETICS

Onset of pain relief 2 hr; peak 1-3 hr; duration 3-4 hr; bioavailability 70%; protein binding 35%; metabolized in the liver (metabolite), metabolized by MAO-A, CYP2D6, CYP3A4; excreted in urine (40%), feces (13%); half-life 3-4 hr

INTERACTIONS

Increase: serotonin syndrome—SSRIs, SNRIs, serotonin-receptor agonists, sibutramine
Increase: vasospastic effects—ergot, ergot derivatives, other 5-HT_1 agonists; avoid concurrent use
⚠ **Increase:** almotriptan effect—MAOIs, do not use together
Increase: plasma concentration of almotriptan—(CYP3A4 inhibitors) itraconazole, ritonavir, erythromycin, ketoconazole, avoid concurrent use in renal/hepatic disease
Drug/Herb
• Avoid use with feverfew
Increase: serotonin syndrome—St. John's wort

NURSING CONSIDERATIONS

Assess:
• **Migraine:** pain location, aura, duration, intensity, nausea, vomiting
• **Serotonin syndrome:** occurs in those taking SSRIs, SNRIs; agitation, confusion, hallucinations, diaphoresis, hypertension, diarrhea, fever, tremor, usually occurs when dose is increased
• B/P; signs/symptoms of coronary vasospasms
• For stress level, activity, recreation, coping mechanisms
• Neurologic status: LOC, blurring vision, nausea, vomiting, tingling, hot sensation, burning, feeling of pressure, numbness, flushing preceding headache
• **Tyramine foods** (pickled products, beer, wine, aged cheese), food additives, preservatives, colorings, artificial sweeteners, chocolate, caffeine, which may precipitate these types of headaches
Perform/provide:
• Quiet, calm environment with decreased stimulation from noise, bright light, excessive talking
Evaluate:
• Therapeutic response: decrease in severity of migraine
Teach patient/family:
• To report chest pain, drowsiness, dizziness, tingling, flushing
• To use contraception while taking product, to notify prescriber if pregnancy is planned or suspected, to avoid breastfeeding
• That if one dose does not relieve migraine to take another after 2 hr
• That product does not prevent or reduce number of migraine attacks; use to relieve attack only

alosetron

(ah-loss'a-tron)

Lotronex

Func. class.: Antidiarrheal, anti-IBS agent

Chem. class.: Serotonin receptor antagonist

ACTION: A potent and selective antagonist at serotonin 5-HT_3 receptors, which are extensively distributed on enteric neurons in GI tract. Antagonism at these receptors in the GI tract modulates the regulation of visceral pain, colonic transit, and GI secretions

USES: Severe, chronic, diarrhea-predominant irritable bowel syndrome (IBS) in women who have failed conventional therapy

CONTRAINDICATIONS: Crohn's disease, severe hepatic disease, diverticulitis, toxic megacolon, GI adhesions/strictures/obstruction/perforation, thrombophlebitis, ulcerative colitis

Black Box Warning: Ischemic colitis, severe constipation

Precautions: Breastfeeding, pregnancy (B), child <18 yr

DOSAGE AND ROUTES

• **Adult woman: PO** 0.5 mg bid, may increase to 1 mg bid after 4 wk if well tolerated, if symptoms are not controlled after 4 wks of treatment with 1 mg bid, discontinue

Available forms:
Tab 0.5 mg, 1 mg

Administer
• Without regard to meals

Black Box Warning: Only after "Physician–Patient Agreement Form" is signed and patient receives official Medication Guide

SIDE EFFECTS

CNS: Fatigue, headache
GI: Constipation, abdominal pain, distention, reflux, nausea, obstruction, impaction, ischemic colitis, ileus perforation, small-bowel mesenteric ischemia
GU: Urinary tract infection
MS: Muscle spasm
RESP: Cough, nasopharyngitis, upper respiratory tract infection

PHARMACOKINETICS

Peak 1 hr, half-life 1½ hr, metabolized extensively in the liver

INTERACTIONS

• Do not use with fluvoxaMINE
Increase: Alosetron metabolism—CYP3A4, 1A2, 2C9 inducers
Increase: serious adverse reactions, drugs that decrease GI motility—drugs with anticholinergic such as TCAs, H_1-blockers, orphenadrine, OLANZapine, maprotiline, disopyramide, cyclobenzaprine, cloZAPine, buPROPion, amoxapine, amantadine
Decrease: Alosetron metabolism—CYP3A4, 1A2, 2C9 inhibitors, hydrALAZINE, procainamide

Drug/Lab Test
Increase: ALT

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Irritable bowel syndrome—constipation, diarrhea, abdominal pain, fecal incontinence, discontinue immediately if bloody diarrhea, severe constipation, rectal bleeding, or severe abdominal pain occur

Black Box Warning: Only clinicians enrolled in the Prometheus Prescribing Program for Lotronex should use this product

• Geriatric women can experience more severe side effects

Perform/provide:
• Storage at room temperature, protect from light and moisture

Evaluate:
• Therapeutic response: Decreasing symptoms of IBS

Teach patient/family:

Black Box Warning: Immediately report severe constipation, bloody diarrhea, rectal bleeding, or worsening abdominal pain

• Not to double doses, if a dose is missed skip it
• That product may be taken without regard to food
• That product does not cure disorder, only controls symptoms
• Provide medication guide and clarify, if needed, that improvement in symptoms can take 1–4 wks
• That product is only used for women with IBS
• To report if pregnancy is planned or suspected, product should not be used during pregnancy, effects are unknown

ALPRAZolam (Rx)

(al-pray'zoe-lam)

Apo-Alpraz ✤, Niravam, Xanax, Xanax XR

Func. class.: Antianxiety

Chem. class.: Benzodiazepine (short/intermediate acting)

Controlled Substance Schedule IV

Do not confuse:
ALPRAZolam/LORazepam
Xanax/Lanoxin/Tylox/Zantac

ACTION: Depresses subcortical levels of CNS, including limbic system, reticular formation

USES: Anxiety, panic disorders with or without agoraphobia, anxiety with depressive symptoms
Unlabeled uses: Premenstrual dysphoric disorders, insomnia, PMS, alcohol withdrawal syndrome

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, hypersensitivity to benzodiazepines, closed-angle glaucoma, psychosis, addiction
Precautions: Geriatric patients, debilitated patients, hepatic disease, obesity, severe pulmonary disease

DOSAGE AND ROUTES

Anxiety disorder
- **Adult: PO** 0.25-0.5 mg tid, may increase q3-4days if needed, max 4 mg/day in divided doses
- **Geriatric: PO** 0.125-0.25 mg bid; increase by 0.125 as needed

Panic disorder
- **Adult: PO** 0.5 mg tid, may increase up to 1 mg/day q3-4days, max 10 mg/day; **EXT REL** (Xanax XR) give daily in AM, 0.5-1 mg initially, maintenance 3-6 mg/day

Hepatic dose
- Reduce dose

Premenstrual dysphoric disorders/PMS (unlabeled)
- **Adult: PO** 0.25 mg bid-qid starting on day 16-18 of menses, taper over 2-3 days when menses occurs, max 4 mg/day

Insomnia (unlabeled)
- **Adult: PO** 0.25-0.5 mg at bedtime

Available forms: Tabs 0.25, 0.5, 1, 2 mg; ext rel tabs (Xanax XR) 0.5, 1, 2, 3 mg; orally disintegrating tabs 0.25, 0.5, 1, 2 mg; oral sol 1 mg/ml

Administer:
- Tabs may be crushed, mixed with food, fluids if patient is unable to swallow medication whole; do not break, crush, chew ext rel (XR), give ext rel tab in AM
- With food or milk for GI symptoms; high-fat meal will decrease absorption
- To discontinue, decrease by 0.5 mg q3days
- May divide total daily doses into more times/day if anxiety occurs between doses
- Orally disintegrating tabs on tongue to dissolve and swallow, protect from moisture

SIDE EFFECTS

CNS: *Dizziness, drowsiness,* confusion, headache, anxiety, tremors, stimulation, fatigue, depression, insomnia, hallucinations, memory impairment, poor coordination, suicide
CV: *Orthostatic hypotension,* ECG changes, tachycardia, hypotension
EENT: *Blurred vision,* tinnitus, mydriasis
GI: Constipation, dry mouth, nausea, vomiting, anorexia, diarrhea, weight gain/loss, increased appetite
GU: Decreased libido
INTEG: Rash, dermatitis, itching, angioedema

PHARMACOKINETICS

PO: Well absorbed; widely distributed; onset 30 min; peak 1-2 hr; duration 4-6 hr; *oral disintegrating tab* peak 1.5-2 hr; therapeutic response 2-3 days; metabolized by liver (CYP3A4), excreted by

kidneys; crosses placenta, breast milk; half-life 12-15 hr, protein binding 80%

INTERACTIONS

Increase: ALPRAZolam action—CYP3A4 inhibitors (cimetidine, disulfiram, erythromycin, FLUoxetine, isoniazid, itraconazole, ketoconazole, metoprolol, propoxyphene, propanolol, valproic acid)

Increase: CNS depression—anticonvulsants, alcohol, antihistamines, sedative/hypnotics, opioids

Decrease: sedation—xanthines

Decrease: ALPRAZolam action—CYP3A4 inducers (barbiturates, rifampin)

Decrease: action of levodopa

Decrease: product level—cigarette smoking

Drug/Herb

Increase: CNS depression—kava, melatonin, St. John's wort, valerian

Drug/Food

Increase: product level—grapefruit juice, avoid concurrent use

Drug/Lab Test

Increase: AST/ALT, alk phos

NURSING CONSIDERATIONS

Assess:

- Mental status: anxiety, mood, sensorium, orientation, affect, sleeping pattern, drowsiness, dizziness, especially in geriatric patients both before and during treatment, suicidal thoughts, behaviors
- B/P lying, standing; pulse; if systolic B/P drops 20 mm Hg, hold product, notify prescriber
- Hepatic, blood studies: AST, ALT, bilirubin, creatinine, LDH, alk phos, CBC; may cause neutropenia, decreased Hct, increased LFTs

Physical dependency, withdrawal symptoms: anxiety, panic attacks, agitation, seizures, headache, nausea, vomiting, muscle pain, weakness; withdrawal seizures may occur after rapid decrease in dose or abrupt discontinuation; because duration of action is short, considered to be the product of choice for geriatric patients

- Pregnancy: if planned or suspected, pregnancy (D), to avoid breastfeeding

Evaluate:

- Therapeutic response: decreased anxiety, restlessness, sleeplessness

Teach patient/family:

- Not to double doses; take exactly as prescribed; if dose is missed, take within 1 hr as scheduled; that product may be taken with food
- Not to use for everyday stress or for more than 4 mo unless directed by prescriber; not to take more than prescribed amount; that product may be habit forming; that memory impairment is a result of long-term use
- To avoid OTC preparations unless approved by prescriber
- Not to use during pregnancy (D), avoid breastfeeding
- Not to discontinue medication abruptly after long-term use
- To avoid driving, activities that require alertness because drowsiness may occur
- To avoid alcohol, other psychotropic medications unless directed by prescriber
- To rise slowly or fainting may occur, especially among geriatric patients
- That drowsiness may worsen at beginning of treatment

TREATMENT OF OVERDOSE:

Lavage, VS, supportive care, flumazenil

RARELY USED

alprostadil (Rx)

(al-pros'ta-dil)

Caverject, Caverject Impulse, Edex, Muse, Prostin VR Pediatric

Func. class.: Hormone

USES: To maintain patent ductus arteriosus (temporary treatment), erectile dysfunction

CONTRAINDICATIONS: Hypersensitivity, respiratory distress syndrome, those at risk for priapism

DOSAGE AND ROUTES

Patent ductus arteriosus

• **Infant: IV INF** 0.05-0.1 mcg/kg/min until desired response, then reduce to lowest effective amount, max 0.4 mcg/kg/min

Erectile dysfunction of vasculogenic or mixed etiology, psychogenic

• **Men: INTRACAVERNOSAL** 2.5 mcg, may increase by 2.5 mcg, may then increase by 5-10 mcg until adequate response occurs (max 60 mcg/dose); **INTRAURETHRAL** 125-250 mcg, max 2 doses/24 hr, max dose 1000 mcg; administer as needed to achieve erection

⚠ HIGH ALERT

alteplase (tissue plasminogen activator, t-PA) (Rx)

(al-ti-plaze')

Activase, Cathflo

Func. class.: Thrombolytic enzyme

Chem. class.: Tissue plasminogen activator (TPA)

Do not confuse:
alteplase/Altace

ACTION: Produces fibrin conversion of plasminogen to plasmin; able to bind to fibrin, convert plasminogen in thrombus to plasmin, which leads to local fibrinolysis, limited systemic proteolysis

USES: Lysis of obstructing thrombi associated with acute MI, ischemic conditions that require thrombolysis (i.e., PE, unclotting arteriovenous shunts, acute ischemic CVA), central venous catheter occlusion (Cathflo)

Unlabeled uses: Arterial thromboembolism, deep vein thrombosis (DVT), occlusion prophylaxis, percutaneous coronary intervention (PCI), subarachnoid hemorrhage

CONTRAINDICATIONS: Active internal bleeding, history of CVA, severe uncontrolled hypertension, intracranial/intraspinal surgery/trauma (within 3 mo), aneurysm, brain tumor, platelets $<100{,}000$ mm^3, bleeding diathesis including INR >1.7 or PR >15 sec, arteriovenous malformation, subarachnoid hemorrhage, intracranial hemorrhage, uncontrolled hypertension, seizure at onset of stroke

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, neurologic deficits, mitral stenosis, recent GI/GU bleeding, diabetic retinopathy, subacute bacterial endocarditis, arrhythmias, diabetic hemorrhage retinopathy, CVA, recent major surgery, hypertension, acute pericarditis, hemostatic defects, significant hepatic disease, septic thrombophlebitis, occluded AV cannula at seriously infected site

DOSAGE AND ROUTES

MI (standard infusion)

• **Adult >65 kg:** 100 mg total given over 3 hr as follows: 6- to 10-mg IV BOL over 1-2 min; remaining 50-54 mg given over the remainder of the hr; during 2nd, 3rd hr 20 mg given by **CONT IV INF** (20 mg/hr)

• **Adult <65 kg:** 1.25 mg/kg over 3 hr: 60% during 1st hr (6%-10% as bolus); remaining 50% given over remainder of hr; during 2nd hr, 20% of dose given by CONT IV INF; 20% given during 3rd hr by CONT IV INF

MI (accelerated infusion)

• **Adult >67 kg:** 100 mg total dose: give 15-mg IV bolus, then 50 mg over 30 min, then 35 mg over 60 min

• **Adult <67 kg:** 15-mg IV bolus, then 0.75 mg/kg (max 50 mg) over 30 min, then 0.5 mg/kg (max 35 mg) over next 60 min

Pulmonary embolism

• **Adult: IV** 100 mg over 2 hr, then heparin

Acute ischemic stroke

• **Adult: IV** 0.9 mg/kg, max 90 mg; give as **INF** over 1 hr, give 10% of dose **IV BOL** over 1st min

Occluded venous access devices

• **Adult/child ≥30 kg: IV** 2 mg/2 ml instilled in occluded catheter, may repeat if needed after 2 hr

• **Child 10-29 kg: IV** 110% of lumen volume, max 2 mg/2 ml instilled in occluded catheter, may repeat if needed after 2 hr

Arterial thromboembolism (unlabeled)

• **Adult: IV** 2 mg/hr for up to 5 hr

Deep venous thrombosis (DVT) (unlabeled)

• **Adult: IV** 4 mcg/kg/min as 2-hr inf, then 1 mcg/kg/min × 33 hr

Percutaneous coronary intervention (PCI) (unlabeled)

• **Adult: INTRACARDIAC** 20 mg over 5 min then 50 mg over the next 60 min

Occlusion prophylaxis (unlabeled)

• **Adult >30 kg:** Do not exceed 2 mg in 2 ml; may use up to 2 doses 120 min apart

Available forms: Powder for inj 50 mg (29 million international units/vial), 100 mg (58 million international units/vial); Cathflo Actinase: lyophilized powder for inj 2 mg

Administer:

Intermittent IV INF route

• After reconstituting with provided diluent, add appropriate amount of sterile water for inj (no preservatives) 20-mg vial/20 ml or 50-mg vial/50 ml to make 1 mg/ml, mix by slow inversion or dilute with NaCl, D_5W to a conc of 0.5 mg/ml; 1.5 to <0.5 mg/ml may result in precipitation of product; use 18G needle; flush line with NaCl after administration, give over 3 hr for MI, 2 hr for PE

• Heparin therapy after thrombolytic therapy is discontinued, TT, ACT, or APTT less than 2× control (about 3-4 hr); treatment can be initiated before coagulation study results obtained, inf should be discontinued if pretreatment INR >1.7, PT >15 sec, or elevated aPTT is identified

• Use reconstituted IV solution within 8 hr or discard

Y-site compatibilities: Eptifibatide, lidocaine, metoprolol, propranolol

• **Cathflo Actinase:** reconstitute by using 2.2 ml of sterile water provided and injecting in vial, direct flow into powder (1 mg/ml), foam will disappear after standing; swirl, do not shake, sol will be pale yellow or clear, use within 8 hr, instill 2 ml of reconstituted sol into occluded catheter, try to aspirate after ½ hr; if unable to remove, allow 2 hr, a 2nd dose may be used; aspirate 5 ml of blood to remove clot and product, irrigate with normal saline

SIDE EFFECTS

CV: Sinus bradycardia, cholesterol microembolization, ventricular tachycardia, accelerated idioventricular rhythm, bradycardia, recurrent ischemic stroke, hypotension

EENT: Orolingual angioedema

INTEG: Urticaria, rash

SYST: GI, GU, intracranial, retroperitoneal bleeding, *surface bleeding*, anaphylaxis, fever

PHARMACOKINETICS

Cleared by liver, 80% cleared within 10 min of product termination, onset immediate, peak 45 min, duration 4 hr, half-life 35 min

INTERACTIONS

Increase: bleeding—anticoagulants, salicylates, dipyridamole, other NSAIDs, abciximab, eptifibatide, tirofiban, clopidogrel, ticlopidine, some cephalosporins, plicamycin, valproic acid

Increase: orolingual angioedema—ACE inhibitors

Decrease: effect—nitroglycerin

Drug/Herb
Increase: risk for bleeding—feverfew, garlic, ginger, ginkgo, ginseng, green tea
Drug/Lab Test
Increase: PT, APTT, TT

NURSING CONSIDERATIONS

Assess:
• Treatment is not recommended for patients with acute ischemic stroke >3 hr after symptom onset or with minor neurologic deficits or rapidly improving symptoms
• VS, B/P, pulse, respirations, neurologic signs, temp at least q4hr; temp >104° F (40° C) indicates internal bleeding; monitor rhythm closely; ventricular dysrhythmias may occur with hyperfusion; monitor heart, breath sounds, neurologic status, peripheral pulses; assess neurologic status, neurologic change may indicate intracranial bleeding; those with severe neurologic deficit (NIH SS >22) at presentation have increased risk of hemorrhage
⚠ **For bleeding** during 1st hour of treatment and 24 hr after procedure: hematuria, hematemesis, bleeding from mucous membranes, epistaxis, ecchymosis; guaiac all body fluids, stools; do not use 150 mg or more total dose because intracranial bleeding may occur
⚠ **Hypersensitivity:** fever, rash, itching, chills, facial swelling, dyspnea, notify prescriber immediately; stop product, keep resuscitative equipment nearby; mild reaction may be treated with antihistamines
• Previous allergic reactions or streptococcal infection; alteplase may be less effective
• Blood studies (Hct, platelets, PTT, PT, TT, APTT) before starting therapy; PT or APTT must be less than 2× control before starting therapy TT or PT q3-4hr during treatment
• **MI:** ECG continuously, cardiac enzymes, radionuclide myocardial scanning/coronary angiography; chest pain intensity, character; monitor those with major early infarct signs on CT scan with substantial edema, mass effect, midline shift
• PE: pulse, B/P, ABGs, rate/rhythm of respirations
• **Occlusion:** have patient exhale then hold breath when connecting/disconnecting syringe to prevent air embolism
• **Cholesterol embolism:** purple toe syndrome, acute renal failure, gangrenous digits, hypertension, livedo reticularis, pancreatitis, MI, cerebral infarction, spinal cord infarction, retinal artery occlusion, bowel infarction, rhabdomyolysis
Perform/provide:
• Avoidance of invasive procedures, inj, rectal temp
• Pressure for 30 sec to minor bleeding sites; 30 min to sites of atrial puncture followed by pressure dressing; inform prescriber if this does not attain hemostasis; apply pressure dressing
• Storage of powder at room temperature or refrigerate; protect from excessive light
Evaluate:
• Therapeutic response: lysis of thrombi
Teach patient/family:
• The purpose and expected results of the treatment; to report adverse reactions

aluminum hydroxide (OTC)

Func. class.: Antacid, hypophosphatemic
Chem. class.: Aluminum product, phosphate binder

ACTION: Neutralizes gastric acidity; binds phosphates in GI tract, these phosphates are then excreted

USES: Antacid, hyperphosphatemia in chronic renal failure; adjunct in gastric, peptic, duodenal ulcers; hyperacidity, reflux esophagitis, heartburn, stress ulcer prevention in critically ill, GERD
Unlabeled uses: GI bleeding

CONTRAINDICATIONS:

Hypersensitivity to product or aluminum products

Precautions: Pregnancy (C), breastfeeding, geriatric patients, fluid restriction, decreased GI motility, GI obstruction, dehydration, renal disease, sodium-restricted diets

DOSAGE AND ROUTES

Antacid

- **Adult: PO** 600 mg 1 hr after meals, at bedtime, max 6 doses/day

Hyperphosphatemia

- **Adult: PO** 300-600 mg tid
- **Child: PO** 50-150 mg/kg/day in 4-6 divided doses

Available forms: Susp 320 mg/5 ml, 600 mg/5 ml

Administer:

- 2 tsp (10 ml) will neutralize 20 mEq of acid

PO route

- Hyperphosphatemia: give with 8 oz water, meals unless contraindicated
- Laxatives or stool softeners if constipation occurs, especially for geriatric patients
- After shaking susp

NG route

- By nasogastric tube if patient unable to swallow

SIDE EFFECTS

GI: *Constipation,* anorexia, obstruction, fecal impaction

META: *Hypophosphatemia,* hypercalciuria

PHARMACOKINETICS

PO: Onset 20-40 min, duration 1-3 hr, excreted in feces

INTERACTIONS

Decrease: effectiveness of—allopurinol, amprenavir, cephalosporins, corticosteroids, delavirdine, digoxin, gabapentin, gatifloxacin, H_2-antagonists, iron salts, isoniazid, ketoconazole, penicillamine, phenothiazines, phenytoin, quiNIDine, quinolones, tetracyclines, thyroid hormones, ticlopidine, anticholinergics; separate by at least 4-6 hr

Drug/Food

Decrease: product effect—high-protein meal

Drug/Lab Test

Decrease: phosphate interference: Tc-99m

NURSING CONSIDERATIONS

Assess:

- **Pain:** location, intensity, duration, character, aggravating, alleviating factors
- Phosphate, calcium levels because product is bound in GI system
- Hypophosphatemia: anorexia, weakness, fatigue, bone pain, hyporeflexia
- Constipation; increase bulk in diet if needed, may use stool softeners or laxatives; record amount and consistency of stools
- **Aluminum toxicity:** severe renal disease, may also be used for hyperphosphatemia

Evaluate:

- Therapeutic response: absence of pain, decreased acidity, healed ulcers, decreased phosphate levels

Teach patient/family:

- Not to use for prolonged periods for patients with low serum phosphate or patients on low-sodium diets, shake liquid well
- That stools may appear white or speckled
- To check with prescriber after 2 wk of self-prescribed antacid use
- To separate from other medications by 2 hr
- **Hyperphosphatemia:** to avoid phosphate foods (most dairy products, eggs, fruits, carbonated beverages) during product therapy
- To notify prescriber black tarry stools, that may indicate bleeding

alvimopan

(al-vim'oh-pan)

Entereg

Func. class.: Functional GI disorder agent

Chem. class.: Peripheral mu-opioid receptor antagonist

ACTION: A peripherally selective mu-opioid receptor antagonist with activity restricted to the GI tract

USES: Prevention of postoperative ileus

Unlabeled uses: Opiate-agonist–induced constipation

CONTRAINDICATIONS: Those who have taken therapeutic doses of opioids for more than 7 consecutive days immediately before starting alvimopan, end-stage renal disease, Child–Pugh C

Precautions: Risk for MI, surgery for complete GI obstruction, hepatic disease, renal disease, pregnancy B, breastfeeding

DOSAGE AND ROUTES

- **Adult/geriatric patient: PO** 12 mg 30 min-5 hr before surgery, then 12 mg bid beginning the day after surgery; max 7 days or hospital discharge; max 15 doses

Opiate agonist–induced constipation (unlabeled)

- **Adult: PO** 0.5 mg or 1 mg every day

Renal/hepatic dosage

- **Adult: PO** Do not use in end-stage renal disease or Child–Pugh Class C

Available forms: Cap 12 mg

Administer

- Without regard to food

Black Box Warning: Only in a hospital setting approved for the ENTEREG Access Support and Education (E.A.S.E.) program

SIDE EFFECTS

GI: *Constipation, dyspepsia,* flatulence, diarrhea, abdominal pain, cramping

HEMA: *Anemia*

META: Hypokalemia

MISC: Back pain, urinary retention, MI

PHARMACOKINETICS

Half-life 10-17 hr, extended in hepatic/renal disease, protein binding 80%-94%

INTERACTIONS

Increase: Alvimopan concentrations, toxicity—amiodarone, bepridil, cycloSPORINE, diltiazem, itraconazole, quiNIDine, quiNINE, spironolactone, verapamil

- Do not us if opiate agonists have been used for 7 consecutive days before alvimopan
- Do not use concurrently with other opiate antagonists

NURSING CONSIDERATIONS

Assess:

- Blood studies: Hgb/Hct, potassium; hyperkalemia occurs
- Recent opioid use, do not use within 7 consecutive days
- Opioid use for chronic pain; MI is more common in this population

Perform/provide:

- Storage at room temperature

Evaluate:

- Therapeutic response: Absence of postoperative ileus

Teach patient/family:

- To notify prescriber if pregnancy is planned or suspected, avoid breastfeeding
- That product is only used for a limited time in a hospital setting
- To report constipation, abdominal pain, cramping

amantadine (Rx)

(a-man'ta-deen)

Func. class.: Antiviral, antiparkinsonian agent

Chem. class.: Tricyclic amine

Do not confuse:
amantadine/ranitidine/rimantidine

ACTION: Prevents uncoating of nucleic acid in viral cell, thereby preventing penetration of virus to host; causes release of DOPamine from neurons

USES: Prophylaxis or treatment of influenza type A, EPS, parkinsonism, Parkinson's disease
Unlabeled uses: Neuroleptic malignant syndrome, MS-associated fatigue

CONTRAINDICATIONS: Hypersensitivity, breastfeeding, children <1 eczematic rash
Precautions: Pregnancy (C), geriatric patients, epilepsy, CHF, orthostatic hypotension, psychiatric disorders, renal/hepatic disease, peripheral edema

DOSAGE AND ROUTES

Influenza type A
- **Adult and child >9 yr: PO** 200 mg/day in single dose or divided bid
- **Geriatric: PO** No more than 100 mg/day
- **Child 1-8 yr: PO** 4.4-8.8 mg/kg/day divided bid-tid, max 150 mg/day

Extrapyramidal reaction/parkinsonism
- **Adult: PO** 100 mg bid up to 400 mg/day in EPS; give for 1 wk then 100 mg as needed up to 400 mg for parkinsonism

Renal dose
- **Adult: PO** CCr 30-50 ml/min 200 mg 1st day then 100 mg/day; CCr 15-29 ml/min 100 mg 1st day then 100 mg on alternate days; CCr 15 ml/min reduce dose and interval to 200 mg q7days

MS-associated fatigue (unlabeled)
- **Adult: PO** 200 mg/day or 100 mg bid

Neuroleptic malignant syndrome (unlabeled)
- **Adult: PO** 100 mg bid × 3 wk

Available forms: Caps 100 mg; oral sol 50 mg/5 ml; tab 100 mg
Administer:
- **Prophylaxis:** before exposure to influenza; continue for 10 days after contact; **treatment:** initiate within 24-48 hr of onset of symptoms, continue for 24-48 hr after symptoms disappear
- After meals for better absorption to decrease GI symptoms; at least 4 hr before bedtime to prevent insomnia
- In divided doses to prevent CNS disturbances: headache, dizziness, fatigue, drowsiness

SIDE EFFECTS

CNS: *Headache, dizziness,* drowsiness, fatigue, *anxiety,* psychosis, *depression, hallucinations,* tremors, seizures, confusion, *insomnia*
CV: *Orthostatic hypotension,* CHF
EENT: Blurred vision
GI: *Nausea, vomiting,* constipation, dry mouth, anorexia
GU: *Frequency, retention*
HEMA: Leukopenia, agranulocytosis
INTEG: Photosensitivity, dermatitis, livedo reticularis

PHARMACOKINETICS

PO: Onset 48 hr, peak 1-4 hr, half-life 24 hr, not metabolized, excreted in urine (90%) unchanged, crosses placenta, excreted in breast milk

INTERACTIONS

Increase: anticholinergic response—atropine, other anticholinergics
Increase: CNS stimulation—CNS stimulants
Decrease: amantadine effect—metoclopramide, phenothiazines
Decrease: renal excretion of amantadine—triamterene, hydrochlorothiazide
Decrease: effect—S/B H1N1 influenza A virus vaccine; avoid use 2 wk before or 48 hr after amantadine

Drug/Lab Test
Increase: BUN, creatinine, alk phos, CK, LDH, bilirubin, AST, ALT, GGT

NURSING CONSIDERATIONS

Assess:
- Mental status: may cause increased psychiatric disorders especially in the elderly
- **CHF** (weight gain, jugular venous distention, dyspnea, crackles)
- Skin eruptions, photosensitivity after administration of product
- Reaction to each medication
- Signs of infection
- **Livedo reticularis:** mottling of the skin, usually red; edema; itching in lower extremities
- **Parkinson's disease:** gait, tremors, akinesia, rigidity, may be effective if anticholinergics have not been effective

⚠ **Toxicity:** confusion, behavioral changes, hypotension, seizures

Perform/provide:
- Storage in tight, dry container

Evaluate:
- Therapeutic response: absence of fever, malaise, cough, dyspnea with infection; tremors, shuffling gait with Parkinson's disease

Teach patient/family:
- To change body position slowly to prevent orthostatic hypotension
- About aspects of product therapy: to report dyspnea, weight gain, dizziness, poor concentration, dysuria, complex sleep behaviors
- To avoid hazardous activities if dizziness, blurred vision occurs
- To take product exactly as prescribed; parkinsonian crisis may occur if product is discontinued abruptly; not to double dose; if a dose is missed, not to take within 4 hr of next dose; caps may be opened and mixed with food
- To avoid alcohol

TREATMENT OF OVERDOSE:

Withdraw product, maintain airway, administer EPINEPHrine, aminophylline, O_2, IV corticosteroids, physostigmine

ambrisentan (Rx)

(am-bri-sen'tan)

Letairis

Func. class.: Antihypertensive
Chem class.: Vasodilator/endothelin receptor antagonist

ACTION: Endothelin-A receptor antagonist; endothelin-A is vasoconstrictor

USES: Pulmonary arterial hypertension, alone or in combination with other antihypertensives

CONTRAINDICATIONS: Breastfeeding, hypersensitivity, idiopathic pulmonary fibrosis (IPF)

Black Box Warning: Pregnancy (X)

Precautions: Children, females, geriatric patients, hepatitis, anemia, heart failure, jaundice, peripheral edema, hepatic disease

DOSAGE AND ROUTES

- **Adult: PO** 5 mg/day; may increase to 10 mg/day if needed

Hepatic dose
- **Adult: PO** Discontinue if AST/ALT >5× ULN, or if elevations are accompanied by bilirubin >2× ULN, or other signs of liver dysfunction

Available forms: Tabs 5, 10 mg

Administer:
- Do not break, crush, chew tabs
- Daily with a full glass of water without regard to food
- Do not discontinue abruptly
- Only those facilities enrolled in the LEAP program (866-664-5327) may administer this product

SIDE EFFECTS

CNS: *Headache,* fever, flushing, fatigue
CV: Orthostatic hypotension, hypotension, *peripheral edema,* palpitations
EENT: Sinusitis, rhinitis
GI: Abdominal pain, constipation, anorexia, hepatotoxicity
GU: Decreased sperm counts

HEMA: *Anemia*
INTEG: Rash, angioedema
RESP: Pharyngitis, dyspnea, pulmonary edema, veno-occlusive disease (VOD)

PHARMACOKINETICS

Rapidly absorbed, peak 2 hr, protein binding 99%, metabolized by CYP3A4, CYP2C19, terminal half-life 15 hr, effective half-life 9 hr

INTERACTIONS

• Possibly increase ambrisentan: cimetidine, clopidogrel, efavirenz, felbamate, fluoxetine, modafinil, oxcarbazepine, ticlopidine
Increase: hypotension—other antihypertensives, diuretics, MAOIs
Increase: ambrisentan—CYP3A4 inhibitors (amprenavir, aprepitant, atazanavir, clarithromycin, conivaptan, cycloSPORINE, dalfopristin, danazol, darunavir, erythromycin, estradiol, imatinib, itraconazole, ketoconazole, nefazodone, nelfinavir, propoxyphene, quinupristin, ritonavir, RU-486, saquinavir, tamoxifen, telithromycin, troleandomycin, zafirlukast); CYP2C19/CYP3A4 (chloramphenicol, delavirdine, fluconazole, fluvoxaMINE, isoniazid, voriconazole)
Decrease: ambrisentan—CYP3A4 inducers (carBAMazepine, PHENobarbital, phenytoin, rifampin)
Decrease: ambrisentan absorption—mefloquine, niCARdipine, propafenone, quiNIDine, ranolazine, tacrolimus, testosterone

Drug/Herb
• Need for ambrisentan dosage change: St. John's wort, ephedra (ma huang)

Drug/Food
• Avoid use with grapefruit products

Drug/Lab Test
Increase: LFTs, bilirubin
Decrease: Hct, Hgb

NURSING CONSIDERATIONS

Assess:
• **Pulmonary status:** improvement in breathing, ability to exercise; pulmonary edema that may indicate veno-occlusive disease
• Blood studies: CBC with differential; Hct, Hgb may be decreased
• Liver function tests: AST, ALT, bilirubin

Black Box Warning: Assess pregnancy status before giving this product; pregnancy category X

• Hepatotoxicity: nausea, vomiting, abdominal pain/cramping, jaundice, anorexia, itching

Perform/provide:
• Storage in tight container at room temp

Evaluate:
• Therapeutic response: decrease in B/P; decreased shortness of breath

Teach patient/family:
• The importance of complying with dosage schedule even if feeling better

Black Box Warning: To notify if pregnancy is planned or suspected (if pregnant, product will need to be discontinued, pregnancy test done monthly); to use 2 contraception methods while taking this product

• Not to use OTC products including herbs, supplements unless approved by prescriber
• To report to prescriber immediately: dizziness, faintness, chest pain, palpitations, uneven or rapid heart rate, headache, edema, weight gain
• To report hepatic dysfunction: nausea/vomiting, anorexia, fatigue, jaundice, right upper quadrant abdominal pain, itching, fever, malaise

amifostine (Rx)

(a-mi-foss'teen)

Ethyol

Func. class.: Cytoprotective agent for cisplatin/radiation

ACTION: Binds and detoxifies damaging metabolites of cisplatin, alkylating agents, DNA-reactive agents, ionizing radiation by converting this product by alk

phos in tissue to an active free thiol compound

USES: To reduce renal toxicity when cisplatin is given repeatedly for ovarian cancer; to reduce xerostomia (dry mouth) after radiation therapy for head, neck cancer

Unlabeled uses: To prevent or reduce cisplatin-induced neurotoxicity, cyclophosphamide-induced granulocytopenia; to prevent or reduce toxicity of radiation therapy; to reduce toxicity of paclitaxel, myelodysplastic syndrome (MDS)

CONTRAINDICATIONS: Breastfeeding, hypersensitivity to mannitol, aminothiol; hypotension, dehydration

Precautions: Pregnancy (C), children, geriatric patients, CV disease, hypocalcemia, MI, radiation therapy, stroke, dehydration, hypotension, chemotherapy, exfoliative dermatitis

DOSAGE AND ROUTES

Reduction of renal damage with cisplatin

- **Adult: IV** 910 mg/m²/day within ½ hr before chemotherapy, give over 15 min; may reduce dose to 740 mg/m² if higher dose is poorly tolerated

Xerostomia prophylaxis

- **Adult: IV** 200 mg/m²/day over 3 min as inf 15-30 min before radiation therapy

Bone marrow suppression/nephrotoxicity/neurotoxicity prophylaxis (unlabeled)

- **Adult: IV** 100-340 mg/m²/day over 15 min before each dose of chemotherapy/radiation

Myelodysplastic syndrome (MDS) (unlabeled)

- **Adult: IV** 100 mg/m² 3×/wk, max 300 mg/m² 3×/wk

Available forms: Powder for inj, lyophilized 500 mg/vial

Administer:

Intermittent IV INF route

- Intermittent inf after reconstituting 500 mg/9.7 ml of sterile 0.9% NaCl, further dilute with 0.9% NaCl to concentration of 5-40 mg/ml, give over 15 min within ½ hr of chemotherapy, place patient in supine position during inf
- **Xerostomia:** Give over 3 min 15-30 min before radiation

Y-site compatibilities: Amikacin, aminophylline, amphotericin B liposome, ampicillin, ampicillin/sulbactam, aztreonam, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium gluconate, carboplatin, carmustine, caspofungin, ceFAZolin, cefotaxime, cefoTEtan, cefOXitin, ceftAZidime, ceftizoxime, cefTRIAXone, cefuroxime, cimetidine, ciprofloxacin, clindamycin, cyclophosphamide, cytarabine, dacarbazine, DACTINomycin, DAPTOmycin, DAUNOrubicin, dexamethasone, dexmedetomidine, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, DOXOrubicin, doxycycline, droperidol, enalaprilat, epirubicin, ertapenem, etoposide, famotidine, fenoldopam, floxuridine, fluconazole, fludarabine, fluorouracil, furosemide, gallium, gentamicin, granisetron, haloperidol, heparin, hydrocortisone, HYDROmorphone, IDArubicin, ifosfamide, imipenem-cilastatin, leucovorin, levofloxacin, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, meperidine, mesna, methotrexate, methylPREDNISolone, metoclopramide, metroNIDAZOLE, mezlocillin, milrinone, mitoMYcin, morphine, nalbuphine, nesiritide, netilmicin, octreotide, ondansetron, oxaliplatin, PACLitaxel, palonosetron, pantoprazole, pemetrexed, piperacillin, plicamycin, potassium chloride, promethazine, ranitidine, sodium bicarbonate, streptozocin, tacrolimus, teniposide, thiotepa, ticarcillin, ticarcillin/clavulanate, tigecycline, tirofiban, tobramycin, trastuzumab, trimethoprim-sulfamethoxazole, trimetrexate,

vancomycin, vinBLAStine, vinCRIStine, voriconazole, zidovudine
Solution compatibility: 0.9% NaCl
Additive incompatibilities: Do not mix with other products

SIDE EFFECTS

CNS: Dizziness, somnolence, loss of consciousness, seizures
CV: *Hypotension*
EENT: *Sneezing*
GI: *Nausea, vomiting,* hiccups, *diarrhea*
INTEG: Flushing, feeling of warmth
MISC: *Hypocalcemia,* rash, chills, anaphylaxis, toxic epidermal necrolysis, toxicoderma, Stevens-Johnson syndrome, exfoliative dermatitis, erythema multiforme

PHARMACOKINETICS

Metabolized to free thiol compound, half-life 8 min, onset 5-8 min

INTERACTIONS

Increase: hypotension—antihypertensives
Drug/Lab
Decrease: calcium

NURSING CONSIDERATIONS

Assess:
• B/P before and q5min during inf; antihypertensives should be discontinued 24 hr before inf if severe hypotension occurs, give IV 0.9% NaCl to expand fluid volume, place patient in modified Trendelenburg position
• Fluid status before administration; administer antiemetic before administration to prevent severe nausea and vomiting; may also give dexamethasone 20 mg IV and a serotonin antagonist such as ondansetron, dolasetron, granisetron
• Calcium levels before and during treatment; may cause hypocalcemia, calcium supplements may be needed
• **Xerostomia:** mouth lesions, dry mouth during therapy
• **Anaphylaxis:** Rash, pruritus, wheezing, laryngeal edema, discontinue; give antihistamines, EPINEPHrine depending on severity; reactions may be delayed, if severe product should be permanently discontinued; other serious skin disorders (Stevens-Johnson syndrome, toxic epidermal necrolysis, toxicoderma, erythema multiforme, exfoliative dermatitis)
Evaluate:
• Therapeutic response: prevention of renal toxicity associated with cisplatin therapy; decreased xerostomia associated with radiation therapy of head, neck cancer
Teach patient/family:
• To stay supine during inf, B/P will be monitored often
• To drink fluids
• To report signs, symptoms, severe reactions
• The reason for the medication and expected results
• That side effects may include severe nausea, vomiting, decreased B/P, chills, dizziness, somnolence, hiccups, sneezing, skin reactions
• Not to breastfeed

amikacin (Rx)

(am-i-kay'sin)
Amikin
Func. class.: Antiinfective
Chem. class.: Aminoglycoside

Do not confuse:
Amikin/Amicar
Amikacin/anakinra

ACTION: Interferes with protein synthesis in bacterial cells by binding to ribosomal subunits, which causes misreading of genetic code; inaccurate peptide sequence forms in protein chain, thereby causing bacterial death

USES: Severe systemic infections of CNS, respiratory tract, GI tract, urinary tract, bone, skin, soft tissues caused by *Staphylococcus aureus (MSSA), Pseu-*

domonas aeruginosa, Escherichia coli, Enterobacter, Acinetobacter, Providencia, Citrobacter, Serratia, Proteus, Klebsiella pneumoniae

Unlabeled uses: *Mycobacterium avium* complex (MAC) (intrathecal or intraventricular) in combination; aerosolization, actinomycotic mycetoma, febrile neutropenia

CONTRAINDICATIONS:

Pregnancy (D), mild to moderate infections, hypersensitivity to aminoglycosides, sulfites

Precautions: Breastfeeding, neonates, geriatric patients, myasthenia gravis, Parkinson's disease

Black Box Warning: Hearing impairment, renal/neuromuscular disease

DOSAGE AND ROUTES

Severe systemic infections

- **Adult and child: IV INF** 10-15 mg/kg/day in 2-3 divided doses q8-12hr in 100-200 ml D_5W over 30-60 min, max 1.5 g; use for 7-10 days; decreased doses are needed with poor renal function as determined by blood levels, renal studies; **pulse dosing** (once-daily dosing) may be used with some infections; **IM** 10-15 mg/kg/day in divided doses q8-12hr; daily or extended-interval dosing as an alternative dosing regimen
- **Infant: IV/IM** 10 mg/kg initially then 7.5 mg/kg q12hr
- **Neonate: IV/IM** 10 mg/kg initially then 7.5 mg/kg q12hr
- **Premature neonate:** 10 mg/kg initially then 7.5 mg/kg q8-12hr

Severe urinary tract infections

- **Adult: IM** 10-15 mg/kg/day divided q8-12hr

Hemodialysis

- **Adult: IM/IV** 7.5 mg/kg followed by 5 mg/kg 3×/wk after each dialysis session (for TIW dialysis)

Renal dose (pulse dosing)

- **Adult: IV** CCr 40-59 ml/min 15 mg/kg q36hr; CCr 20-39 ml/min 15 mg/kg q48hr; <20 ml/min adjust based on serum concentrations and MIC

Mycobacterium avium complex (MAC) (unlabeled)

- **Adult and adolescent: IV** 7.5-15 mg/kg divided q12-24hr as part of multiple-drug regimen
- **Child: IV** 15-30 mg/kg/day divided q12-24hr as part of multiple-drug regimen, max 1.5 g/day

Actinomycotic mycetoma (unlabeled)

- **Adult: IM/IV** 15 mg/kg/day in 2 divided doses × 3 wk with co-trimoxazole for 5 wk; repeat cycle once, may be repeated 2×

Available forms: Inj 50, 250 mg/ml

Administer:

IM route

- Inj in large muscle mass; rotate inj sites
- Obtain C&S before administration, begin treatment before results
- Obtain peak 1 hr after IM, trough before next dose

Intermittent IV INF route

- Dilute 500 mg of product/100-200 ml of D_5W, 0.9% NaCl and give over $^1/_2$-1 hr; dilute in sufficient volume to allow for inf over 1-2 hr (infants); flush after administration with D_5W or 0.9% NaCl; sol clear or pale yellow; discard if precipitate or dark color develops
- In children, amount of fluid will depend on ordered dose; in infants, infuse over 1-2 hr
- In evenly spaced doses to maintain blood level, separate from penicillins by at least 1 hr

Y-site compatibilities: Acyclovir, aldesleukin, alfentanil, amifostine, aminophylline, amiodarone, amsacrine, anidulafungin, ascorbic acid, atracurium, atropine, aztreonam, benztropine, bivalirudin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, caspofungin, ceFAZolin, cefepime, cefonicid, cefotaxime, cefoTEtan, cefOXitin, ceftAZidime, ceftizoxime, ceftRIAXone, cefuroxime, chloramphenicol, chlorproMAZINE, cimetidine, cisatracurium, CISplatin, clindamycin, codeine, cyanoco-

balamin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, dexmedetomidine, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, doripenem, doxacurium, DOXOrubicin, doxycycline, eftifibatide, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, epoetin alfa, ertapenem, erythromycin, esmolol, etoposide, famotidine, fentaNYL, filgrastim, fluconazole, fludarabine, fluorouracil, foscarnet, furosemide, gemcitabine, gentamicin, glycopyrrolate, granisetron, hydrocortisone, HYDROmorphone, IDArubicin, ifosfamide, IL-2, imipenem/cilastin, isoproterenol, ketorolac, labetalol, levofloxacin, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, melphalan, meperidine, metaraminol, methotrexate, methoxamine, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, midazolam, milrinone, mitoXANtrone, morphine, multivitamins, nafcillin, nalbuphine, naloxone, niCARdipine, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pantoprazole, papaverine, PEMEtrexed, penicillin G, pentazocine, perphenazine, PHENobarbital, phenylephrine, phytonadione, piperacillin/tazobactam, potassium chloride, procainamide, prochlorperazine, promethazine, propranolol, protamine, pyridoxine, quinupristin/dalfopristin, ranitidine, remifentanil, riTUXimab, rocuronium, sargramostim, sodium acetate, sodium bicarbonate, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiamine, thiotepa, ticarcillin/clavulanate, tigecycline, tirofiban, tobramycin, tolazoline, trimethaphan, urokinase, vancomycin, vasopressin, vecuronium, verapamil, vinCRIStine, vinorelbine, voriconazole, warfarin, zidovudine

SIDE EFFECTS

CNS: Confusion, depression, numbness, tremors, seizures, muscle twitching, neurotoxicity, dizziness, vertigo, tinnitus, neuromuscular blockade with respiratory paralysis

CV: Hypo/hypertension, palpitations

EENT: *Ototoxicity,* deafness, visual disturbances

GI: *Nausea, vomiting, anorexia;* increased ALT, AST, bilirubin; hepatomegaly, hepatic necrosis, splenomegaly

GU: Oliguria, hematuria, renal damage, azotemia, renal failure, nephrotoxicity

HEMA: Agranulocytosis, thrombocytopenia, leukopenia, eosinophilia, anemia

INTEG: *Rash,* burning, urticaria, dermatitis, alopecia

PHARMACOKINETICS

IM: Onset rapid, peak 1-2 hr, leads to unpredictable concentrations, IV preferred

IV: Onset immediate, peak 15-30 min; half-life 2-3 hr, prolonged up to 7 hr in infants; not metabolized; excreted unchanged in urine; crosses placenta; removed by hemodialysis

INTERACTIONS

• Mask ototoxicity: dimenhyDRINATE, ethacrynic acid

Increase: serum trough and peak—NSAIDs

Increase: nephrotoxicity—cephalosporins, acyclovir, vancomycin, amphotericin B, cycloSPORINE, loop diuretics, cidofovir

Increase: neuromuscular blockade, respiratory depression—anesthetics, nondepolarizing neuromuscular blockers

Drug/Lab Test

Increase: BUN, creatinine

NURSING CONSIDERATIONS

Assess:

• Weight before treatment; calculation of dosage is usually based on ideal body weight but may be calculated on actual body weight

• I&O ratio; urinalysis daily for proteinuria, cells, casts; report sudden change in urine output

• VS during infusion; watch for hypotension, change in pulse

• IV site for thrombophlebitis including pain, redness, swelling q30min; change site if needed; apply warm compresses to discontinued site

Black Box Warning: Renal impairment by securing urine for CCr, BUN, serum creatinine; lower dosage should be given with renal impairment; nephrotoxicity may be reversible if product stopped at 1st sign

Black Box Warning: Deafness: audiometric testing, ringing, roaring in ears, vertigo; assess hearing before, during, after treatment

• Dehydration: high specific gravity, decrease in skin turgor, dry mucous membranes, dark urine
• Overgrowth of infection: increased temp, malaise, redness, pain, swelling, perineal itching, diarrhea, stomatitis, change in cough, sputum
• Vestibular dysfunction: nausea, vomiting, dizziness, headache; product should be discontinued if severe

Black Box Warning: Neuromuscular blockade; respiratory paralysis may occur

Perform/provide:
• Adequate fluids of 2-3 L/day, unless contraindicated, to prevent irritation of tubules

Evaluate:
• Therapeutic response: absence of fever, draining wounds, negative C&S after treatment

Teach patient/family:
• To report headache, dizziness, symptoms of overgrowth of infection, renal impairment; symptoms of neurotoxicity, hepatotoxicity
⚠ To report loss of hearing; ringing, roaring in ears; feeling of fullness in head
• To report hypersensitivity: rash, itching, trouble breathing, facial edema; notify health care provider

TREATMENT OF HYPERSENSITIVITY: Hemodialysis, exchange transfusion in the newborn, monitor serum levels of product, may give ticarcillin or carbenicillin

aMILoride (Rx)

(a-mill'oh-ride)

Midamor

Func. class.: Potassium-sparing diuretic

Chem. class.: Pyrazine

Do not confuse:
aMILoride/amLODIPine/amiodarone

ACTION: Inhibits sodium, potassium ATPase in the distal tubule, cortical collecting duct resulting in inhibition of sodium reabsorption and decreasing potassium secretion

USES: Edema in CHF in combination with other diuretics, for hypertension, adjunct with other diuretics to maintain potassium, polyuria due to lithium administration
Unlabeled uses: Ascites

CONTRAINDICATIONS: Anuria, hypersensitivity, impaired renal function, diabetic nephropathy

Black Box Warning: Hyperkalemia

Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, dehydration, diabetes, respiratory acidosis, hyponatremia

DOSAGE AND ROUTES

• **Adult: PO** 5-10 mg/day in 1-2 divided doses; may be increased to 10-20 mg/day if needed
• **Infant/child (6-20 kg): PO** 0.625 mg/kg/day

Renal dose
• **Adult: PO** CCr 10-50 ml/min reduce dose by 50%; however, avoid if possible; CCr < 10 ml/min contraindicated

Ascites (unlabeled)
• **Adult: PO** 10 mg/day, max 40 mg

Available forms: Tabs 5 mg

Administer:
• In AM to avoid interference with sleep if using as diuretic; if 2nd daily dose is needed, give in late afternoon

• With food; if nausea occurs, absorption may be decreased slightly

SIDE EFFECTS

CNS: *Headache,* dizziness, fatigue, weakness, paresthesias, tremor, depression, anxiety, encephalopathy
CV: *Orthostatic hypotension,* dysrhythmias, chest pain
EENT: Blurred vision, increased intraocular pressure
ELECT: Hyperkalemia, dehydration, hyponatremia, hypochloremia
GI: *Nausea, diarrhea,* dry mouth, *vomiting, anorexia,* cramps, constipation, abdominal pain, jaundice
GU: *Polyuria,* dysuria, urinary frequency, impotence
HEMA: Aplastic anemia, neutropenia
INTEG: *Rash, pruritus,* alopecia, urticaria
MS: Cramps
RESP: Cough, dyspnea, shortness of breath

PHARMACOKINETICS

15%-25% absorbed from GI tract; widely distributed; onset 2 hr; peak 3-4 hr; duration 24 hr; excreted in urine, feces; half-life 6-9 hr

INTERACTIONS

Black Box Warning: Hyperkalemia: other potassium-sparing diuretics, potassium products, ACE inhibitors, salt substitutes, cycloSPORINE, tacrolimus; avoid concurrent use, if using together monitor potassium level

Increase: lithium toxicity: lithium, monitor lithium levels
Increase: action of antihypertensives
Decrease: effect of amiloride—NSAIDs, avoid concurrent use

Drug/Herb
Increase: effect—hawthorn, horse chestnut

Drug/Food
• Possible hyperkalemia: foods high in potassium, potassium-based salt substitutes

Drug/Lab Test
Increase: LFTs, BUN, potassium, sodium
Interference: GTT

A

NURSING CONSIDERATIONS

Assess:
• Heart rate, B/P lying, standing; postural hypotension may occur
• Electrolytes: potassium, sodium, chloride; glucose (serum), BUN, CBC, serum creatinine, blood pH, ABGs, periodic ECG
• Discontinue potassium-sparing diuretics 3 days before GTT, hyperkalemia may occur
• **Hypokalemia:** weakness, polyuria, polydipsia, fatigue, ECG U wave

Black Box Warning: Hyperkalemia: fatigue, weakness, paresthesia, confusion, dyspnea, dysrhythmias, ECG changes

Evaluate:
• Therapeutic response: improvement in edema of feet, legs, sacral area daily if medication is being used for CHF; decreased B/P; prevention of hypokalemia (diuretics)

Teach patient/family:
• To take as prescribed; if dose is missed, to take when remembered within 1 hr of next dose; to take with food or milk for GI symptoms; to take early in day to prevent nocturia
• About adverse reactions: muscle cramps, weakness, nausea, dizziness, blurred vision
• To avoid potassium-rich foods: oranges, bananas, salt substitutes, dried fruits
• To rise slowly from sitting to standing to avoid orthostatic hypotension
• To avoid hazardous activities if dizziness occurs

TREATMENT OF OVERDOSE:

Lavage if taken orally, monitor electrolytes, administer sodium bicarbonate for potassium >6.5 mEq/L, IV glucose, kayoxalate as needed; monitor hydration, CV, renal status

amino acids
(a-mee'noe)

amino acid infusions (crystalline)
Aminosyn, Amynosyn II, Aminosyn-PF, Clinisol, FreAmine III, Premasol, Travasol, TrophAmine

amino acid infusions/ dextrose
Aminosyn II with dextrose, Clinimix, Amino Acid Infusions/ electrolytes

aminosyn with electrolytes
Aminosyn II with electrolytes, FreAmine III with electrolytes, ProcalAmine with electrolytes, Travasol with electrolytes

amino acid infusions/ electrolytes/dextrose
Aminosyn II with electrolytes in dextrose

amino acid infusions (hepatic failure)
HepatAmine, Hepatasol

amino acid infusions (high metabolic atress)
Aminosyn-HBC, FreAmine HBC

amino acid infusions (renal failure)
Aminosyn-RF, NephrAmine

Func. class.: Nutritional supplement/ protein

Chem. class.: n/a

ACTION: Needed for anabolism to maintain structure, decrease catabolism, promote healing

Black Box Warning: Central infusions: Administration by central venous catheter should be used only by those familiar with this technique and its complications

USES: Hepatic encephalopathy, cirrhosis, hepatitis, nutritional support in cancer; burn or solid organ transplant patients; to prevent nitrogen loss when adequate nutrition by mouth, gastric, or duodenal tube cannot be obtained

CONTRAINDICATIONS: Hypersensitivity, severe electrolyte imbalances, anuria, severe liver damage, maple syrup urine disease, PKU, azotemia, genetic disease of amino acid metabolism

Precautions: Pregnancy (C), breastfeeding, children, renal disease, diabetes mellitus, CHF, sulfite sensitivity

DOSAGE AND ROUTES

Nutritional support (cirrhosis, hepatic encephalopathy, hepatitis)

- **Adult: IV** 80-120 g/day amino acids/12-18 g nitrogen of hepatic failure formula

TPN

- **Adult: IV** 1-1.5 g/kg/day

Metabolic stress (severe)

- **Adult: IV** 1.5 g/kg, use formula for high metabolic stress

Renal failure (nutritional support)

- **Adult: IV** Minosyn-RF 300-600 ml/70% dextrose/day; NephrAmine 250-500 ml/70% dextrose/day; the total daily dosage is calculated based on the daily protein requirements, as well as the patient's metabolic and clinical response. Check product instructions for specific directions
- **Child ≥10 kg (22 lb): IV** 20-25 g/day × first 10 kg, then 1-1.25 g/kg/day for each kg >10 kg
- **Child <10 kg (22 lb): IV** 2-4 kg/day
- **Child: IV** 1 g/kg/day max
- The dosage and constant infusion rate of IV dextrose must be selected with caution in children, particularly neonates and low birth weight infants, because of

the increased risk of hyperglycemia/hypoglycemia. Owing to their concentration, these solutions are not recommended for use in children younger than 1 year

• The total daily dosage is calculated based on the daily protein requirements, as well as the patient's metabolic and clinical response. Check each product's instructions for specific directions

Available forms:

Injection: 250, 500, 1000, 2000 ml, containing amino acids in various concentrations; amino acid infusions, crystalline: Aminosyn: 3.5%, 5%, 7%, 8.5%, 10%; AminosynII: 3.5%, 5%, 7%, 8.5%, 10%, 15%; Aminosyn-PF: 7%, 10%; Clinisol: 15%; FreAmine III: 8.5%, 10%; Premasol: 6%, 10%; Travasol: 10%; TrophAmine: 6%, 10%

Amino acid infusion/dextrose:

Aminosyn II: 3.5% in 5% dextrose, 4.25% in 20% dextrose, 4.25% in 10% dextrose 4.25% in 25% dextrose; Clinimix: 2.75% in 5% dextrose, 4.25% in 5% dextrose, 4.25% in 10% dextrose 4.25% in 20% dextrose, 4.25% in 25% dextrose, 5% in 10% dextrose, 5% in 15% dextrose, 5% in 20% dextrose, 5% in 25% dextrose, 5 Amino acid infusions/electrolytes: Aminosyn: 3.5%, 7%, 8.5%; Aminosyn II: 3.5%, 7%, 8.5%; FreAmine III: 3%, 8.5%; ProcalAmine: 3%; Travasol: 3.5%, 5.5%, 8.5%

Amino acid infusions/electrolytes/dextrose:

Aminosyn II: 3.5% with electrolytes in 5% dextrose, 3.5% with electrolytes in 25% dextrose, 4.25% with electrolytes in 10% dextrose, 4.25% with electrolytes in 20% dextrose, 4.25% with electrolytes in 25% dextrose; Amino acid infusions (hepatic failure): HepatAmine: 8%; Hepatasol: 8%

Amino acid infusions (high metabolic stress):

Aminosyn-HBC 7%; Freamine HBC: 6.9%; Amino acid (renal failure): Aminosyn-RF:5.2%; NephrAmine: 5.4%

Administer:

Continuous IV INF route

• Up to 40% protein and dextrose (up to 12.5%) via peripheral vein; stronger sol requires central IV administration

• TPN only mixed with dextrose to promote protein synthesis

• Immediately after mixing under strict aseptic technique, use inf pump, in-line filter (0.22 μm) unless mixed with fat emulsion and dextrose (3 in 1). Using careful monitoring technique; do not speed up inf; pulmonary edema, glucose overload will result

SIDE EFFECTS

CNS: Dizziness, headache, confusion, loss of concentration, fever

CV: Hypertension, CHF/pulmonary edema, flushing, thrombosis

ENDO: Hyperglycemia, rebound hypoglycemia, electrolyte imbalances, hyperosmolar hyperglycemic nonketotic syndrome, alkalosis, hypophosphatemia, hyperammonemia, dehydration, hypocalcemia

GI: Nausea, abdominal pain

GU: Glycosuria osmotic dieresis

INTEG: Extravasation necrosis, phlebitis at inj site

INTERACTIONS

Individual Drugs

Decrease: Protein-sparing effects—tetracycline

Drug/Lab Test

Increase: LFTs, ammonia glucose

Decrease: Potassium, phosphate, glucose

NURSING CONSIDERATIONS

Assess:

• Electrolytes (potassium, sodium, phosphate, chloride, magnesium, bicarbonate, blood glucose, ammonia, ketones)

• Renal/hepatic studies: BUN, creatinine, ALT, AST, bilirubin

• Weight changes, triglycerides before and after inf; vit A level with renal disease

- Inj site for extravasation: redness along vein, edema at site, necrosis, pain, hard tender area; site should be changed immediately
- Discontinue inf, culture tubing and sol
- **Sepsis:** chills, fever, increased temperature, if sepsis is suspected
- For impending hepatic coma: asterixis, confusion, uremic fetor, lethargy
- Hyperammonemia: nausea, vomiting, malaise, tremors, anorexia, seizures
- Change of dressing and IV tubing to prevent infection every 24-48 hr if chills, fever, other signs of infection occur

Evaluate:

- Therapeutic response: weight gain, decrease in jaundice with liver disorders, increased LOC

Teach patient/family:

- Reason for use of TPN
- If chills, sweating are experienced to report at once
- About infusion pump and blood glucose

⚠ HIGH ALERT

amiodarone (Rx)

(a-mee-oh'da-rone)

Cordarone, Nexterone, Pacerone

Func. class.: Antidysrhythmic (class III)

Chem. class.: Iodinated benzofuran derivative

Do not confuse:

amiodarone/Inamrinone
Cordarone/Inocor

ACTION: Prolongs duration of action potential and effective refractory period, noncompetitive α- and β-adrenergic inhibition; increases PR and QT intervals, decreases sinus rate, decreases peripheral vascular resistance

USES: Hemodynamically unstable ventricular tachycardia, supraventricular tachycardia, ventricular fibrillation not controlled by 1st-line agents

Unlabeled uses: Atrial fibrillation treatment/prophylaxis, atrial flutter, cardiac arrest, cardiac surgery, CPR, heart failure, PSVT, Wolff-Parkinson-White (WPW) syndrome

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, neonates, infants, severe sinus node dysfunction, hypersensitivity, cardiogenic shock

Black Box Warning: 2nd-3rd degree AV block, bradycardia

Precautions: Children, goiter, Hashimoto's thyroiditis, electrolyte imbalances, CHF, respiratory disease

Black Box Warning: Severe hepatic disease, cardiac arrhythmias, pneumonitis, pulmonary fibrosis

DOSAGE AND ROUTES

Ventricular dysrhythmias

- **Adult: PO** Loading dose 800-1600 mg/day for 1-3 wk then 600-800 mg/day for 1 mo, maintenance 400 mg/day; **IV** loading dose (1st rapid) 150 mg over the first 10 min then slow 360 mg over the next 6 hr, maintenance 540 mg given over the remaining 18 hr, decrease rate of the slow inf to 0.5 mg/min
- **Child (unlabeled): PO** Loading dose 10-15 mg/kg/day in 1-2 divided doses for 4-14 days then 5 mg/kg/day
- **Child and infant: IV/INTRAOSSEOUS** (during CPR) 5 mg/kg as a bolus (PALS guidelines)

Perfusion tachycardia

- **Adult: IV** 5 mg/kg loading dose given over 20-60 min

Supraventricular dysrhythmias (atrial fibrillation, atrial flutter, PSVT, WPW syndrome) (unlabeled)

- **Adult: PO** 1.2-1.8 g/day divided until a total of 10 g has been given, then 200-400 mg/day (class IIa recommendation); **IV** 5-7 mg/kg over 30-60 min, then 1.2-1.8 g as **CONT IV INF** or in divided PO doses until 10 g, then 200-400 mg/day (class IIa recommendation)

• **Child and infant: PO** 10-20 mg/kg/day in divided doses for 7-10 days, then 5-10 mg/kg/day once daily

Available forms: Tabs 100, 200, 400 mg; inj 50 mg/ml

Administer:

PO route

• May be used with/without food but be consistent

IV, direct route

• **Peripheral:** max 2 mg/ml for more than 1 hr; preferred through central venous line with in-line filter; concentrations of more than 2 mg/ml should be given by central line

• **Cardiac arrest:** give 300 bol; may repeat 150 mg after 3-5 min

Intermittent IV INF route

• **Rapid loading:** add 3 ml (150 mg), 100 ml D_5W (1.5 mg/ml), give over 10 min

• **Slow loading:** add 18 ml (900 mg), 500 ml D_5W (1.8 mg/ml), give over next 6 hr

Continuous IV INF route

• After 24 hr, dilute 50 ml to 1-6 mg/ml, give 1-6 mg/ml at 1 mg/min for the 1st 6 hr, then 0.5 mg/min

Y-site compatibilities: Amikacin, clindamycin, DOBUTamine, DOPamine, doxycycline, erythromycin, esmolol, gentamicin, insulin, isoproterenol, labetalol, lidocaine, metaraminol, metroNIDAZOLE, midazolam, morphine, nitroglycerin, norepinephrine, penicillin G potassium, phenylephrine, potassium chloride, procainamide, tobramycin, vancomycin

Solution compatibility: D_5W, 0.9% NaCl

SIDE EFFECTS

CNS: *Headache, dizziness,* involuntary movement, *tremors, peripheral neuropathy,* malaise, *fatigue,* ataxia, *paresthesias,* insomnia

CV: *Hypotension, bradycardia,* sinus arrest, CHF, dysrhythmias, SA node dysfunction, AV block, increased defibrillation energy requirement

EENT: Blurred vision, halos, photophobia, *corneal microdeposits,* dry eyes

ENDO: *Hypo*/hyperthyroidism

GI: *Nausea, vomiting,* diarrhea, abdominal pain, *anorexia, constipation,* hepatotoxicity

GU: Epididymitis, ED

INTEG: Rash, photosensitivity, blue-gray skin discoloration, alopecia, spontaneous ecchymosis, toxic epidermal necrolysis, urticaria, pancreatitis, phlebitis (IV)

MISC: Flushing, abnormal taste or smell, edema, abnormal salivation, coagulation abnormalities

MS: Weakness, pain in extremities

RESP: Pulmonary fibrosis/toxicity, pulmonary inflammation, ARDS; gasping syndrome if used with neonates

PHARMACOKINETICS

PO: Onset 1-3 wk, peak 2-7 hr, half-life 26-107 days, metabolized by liver (CYP3A4, CYP2C8), excreted by kidneys, 99% protein binding

INTERACTIONS

Increase: QT prolongation—azoles, fluoroquinolones, macrolides

Increase: amiodarone concentrations, possible serious dysrhythmias-protease inhibitors, reduce dose

Increase: myopathy—HMG-CoA reductase inhibitors

Increase: bradycardia—β-blockers, calcium channel blockers

Increase: levels of cycloSPORINE, dextromethorphan, digoxin, disopyramide, flecainide, methotrexate, phenytoin, procainamide, quiNIDine, theophylline, class I antidysrhythmics

Increase: anticoagulant effects—warfarin

Drug/Food

• Toxicity: grapefruit juice

Drug/Lab Test

Increase: T_4, ALT, AST, GGT alk phos, cholesterol, lipids, PT, INR

Decrease: T_3

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Pulmonary toxicity: dyspnea, fatigue, cough, fever, chest pain; product should be discontinued; for ARDS, pulmonary fibrosis, crackles, tachypnea, increased at higher doses, toxicity is common

Black Box Warning: ECG continuously to determine product effectiveness; measure PR, QRS, QT intervals; check for PVCs, other dysrhythmias, B/P continuously for hypo/hypertension; report dysrhythmias, slowing heart rate; monitor amiodarone level: therapeutic 1-2.5 mcg/ml; toxic >2.5 mcg/ml

- Electrolytes (sodium, potassium, chloride); hepatic studies: AST, ALT, bilirubin, alk phos; for dehydration, hypovolemia, monitor PT, INR if using warfarin
- Chest x-ray, thyroid function tests
- CNS symptoms: confusion, psychosis, numbness, depression, involuntary movements; product should be discontinued
- **Hypothyroidism:** lethargy; dizziness; constipation; enlarged thyroid gland; edema of extremities; cool, pale skin
- **Hyperthyroidism:** restlessness; tachycardia; eyelid puffiness; weight loss; frequent urination; menstrual irregularities; dyspnea; warm, moist skin
- Ophthalmic exams at baseline and periodically (PO); to prevent corneal deposits, use methylcellulose
- Cardiac rate, respirations: rate, rhythm, character, chest pain; start with patient hospitalized and monitored up to 1 wk; for rebound hypertension after 1-2 hr

Evaluate:

- Therapeutic response: decrease in ventricular tachycardia, supraventricular tachycardia, fibrillation

Teach patient/family:

- To take this product as directed; to avoid missed doses; not to use with grapefruit juice; do not discontinue abruptly
- To use sunscreen or stay out of sun to prevent burns; that dark glasses may be needed for photophobia
- To report side effects immediately; more common at high dose
- That skin discoloration is usually reversible

TREATMENT OF OVERDOSE:

O_2, artificial ventilation, ECG, administer DOPamine for circulatory depression, administer diazepam, thiopental for seizures, isoproterenol

amitriptyline (Rx)

(a-mee-trip'ti-leen)

Func. class.: Antidepressant—tricyclic

Chem. class.: Tertiary amine

Do not confuse:

amitriptyline/nortriptyline/aminophylline

ACTION: Blocks reuptake of norepinephrine, serotonin into nerve endings, thereby increasing action of norepinephrine, serotonin in nerve cells

USES: Major depression

Unlabeled uses: Neuropathic pain, prevention of cluster/migraine headaches, fibromyalgia, ADHD, bulimia nervosa, diabetic neuropathy, enuresis, insomnia, panic disorder, postherpetic neuralgia, hiccups, social phobia

CONTRAINDICATIONS: Hypersensitivity to tricyclics, recovery phase of myocardial infarction

Precautions: Pregnancy (C), breastfeeding, geriatric patients, seizure disorders, prostatic hypertrophy, schizophrenia, psychosis, severe depression, increased intraocular pressure, closed-angle glaucoma, urinary retention, renal/hepatic/cardiac disease, hyperthyroidism, electroshock therapy, elective surgery

Black Box Warning: Children <12 yr, suicidal patients

DOSAGE AND ROUTES

Depression

- **Adult/adolescent: PO** 25-75 mg/day as single dose at bedtime or in divided doses, may increase to 200 mg/day; max 300 mg/day (if hospitalized)
- **Geriatric: PO** 10-25 mg at bedtime, may be increased to 150 mg/day

Cluster/migraine headache (unlabeled)

- **Adult: PO** 10-300 mg/day

Pain (unlabeled)

- **Adult: PO** 75-300 mg/day

Fibromyalgia/insomnia (unlabeled)

- **Adult: PO** 10-50 mg nightly

Enuresis (unlabeled)

- **Child 11-14 yr: PO** 50 mg at bedtime
- **Child 6-10 yr: PO** 25 mg at bedtime

ADHD/bulimia nervosa (unlabeled)

- **Adult: PO** 25 mg tid, titrate to 200 mg/day by 25-50 mg at weekly intervals
- **Child 6-12 yr: PO** 10-30 mg/day or 1-5 mg/kg/day in divided doses

Available forms: Tabs 10, 25, 50, 75, 100, 150 mg

Administer:

- Increase fluids, bulk in diet if constipation, urinary retention occur, especially in geriatric patients
- With food, milk for GI symptoms
- Crushed if patient unable to swallow medication whole
- Dosage at bedtime if oversedation occurs during day; may take entire dose at bedtime; geriatric patients may not tolerate once daily dosing

SIDE EFFECTS

CNS: *Dizziness, drowsiness,* confusion, headache, anxiety, tremors, stimulation, weakness, insomnia, nightmares, EPS (geriatric patients), increased psychiatric symptoms, seizures, suicidal thoughts

CV: *Orthostatic hypotension,* ECG changes, tachycardia, hypertension, palpitations, dysrhythmias

EENT: *Blurred vision,* tinnitus, mydriasis, ophthalmoplegia

GI: *Constipation, dry mouth,* weight gain, nausea, vomiting, paralytic ileus, increased appetite, cramps, epigastric distress, jaundice, hepatitis, stomatitis

GU: *Urinary retention*

HEMA: Agranulocytosis, thrombocytopenia, eosinophilia, leukopenia, aplastic anemia

INTEG: Rash, urticaria, sweating, pruritus, photosensitivity

PHARMACOKINETICS

Onset 45 min; peak 2-12 hr; therapeutic response 4-10 days; metabolized by liver to nortriptyline; excreted in urine, feces; crosses placenta; excreted in breast milk; half-life 10-46 hr

INTERACTIONS

⚠ Hyperpyretic crisis, seizures, hypertensive episode: MAOIs, do not use within 14 days of MAOIs

Increase: risk for agranulocytosis—antithyroid agents

Increase: QT prolongation—procainamide, quiNIDine, amiodarone, tricyclics, class IA, III antidysrhythmics

Increase: amitriptyline levels, toxicity—cimetidine, FLUoxetine, phenothiazines, oral contraceptives, antidepressants, carBAMazepine, class IC antidysrhythmics

Increase: effects of direct-acting sympathomimetics (EPINEPHrine), alcohol, barbiturates, benzodiazepines, CNS depressants, opioids, sedative/hypnotics

Increase: serotonin syndrome, linezolid, methyline blue, use cautiously

Decrease: effects of guanethidine, cloNIDine, indirect-acting sympathomimetics (ePHEDrine)

Drug/Herb

Increase: serotonin syndrome—SAM-e, St. John's wort, yohimbe

Increase: CNS depression—kava, hops, chamomile, lavender, valerian

Drug/Lab Test

Increase: serum bilirubin, blood glucose, alk phos, LFTs

Decrease: WBCs, platelets, granulocytes

NURSING CONSIDERATIONS

Assess:

- B/P lying, standing; pulse q4hr; if systolic B/P drops 20 mm Hg, hold product, notify prescriber; take vital signs q4hr with CV disease; ECG for flattening of T wave, prolongation of QTc interval, bundle branch block, AV block, dysrhythmias in cardiac patients, avoid use immediately after MI
- Blood studies: CBC, leukocytes, differential, cardiac enzymes if patient is receiving long-term therapy
- Hepatic studies: AST, ALT, bilirubin
- Weight every wk; appetite may increase with product
- EPS primarily in geriatric patients: rigidity, dystonia, akathisia

Black Box Warning: Mental status: mood, sensorium, affect, suicidal tendencies; increase in psychiatric symptoms: depression, panic; suicidal tendencies are higher in those ≤24 yr, restrict amount of product available

- Serotonin syndrome: may occur with other serotonergic products (hyperthermia, hypertension, rigidity, delirium)
- Urinary retention, constipation; constipation is most likely to occur in children and geriatric patients
- **Withdrawal symptoms:** headache, nausea, vomiting, muscle pain, weakness; do not usually occur unless product was discontinued abruptly
- Alcohol consumption: if alcohol is consumed, hold dose until morning
- **Pain syndromes (unlabeled):** intensity, location, severity; use pain scale; product may be taken for 1-2 mo before effective
- **Sexual dysfunction:** erectile dysfunction, decreased libido

Perform/provide:

- Storage at room temp; do not freeze

Evaluate:

- Therapeutic response: decrease in depression, absence of suicidal thoughts

Teach patient/family:

- To take medication as directed; not to double dose; that therapeutic effects may take 2-3 wk; not to discontinue medication quickly after long-term use: may cause nausea, headache, malaise
- To use caution when driving, performing other activities that require alertness because of drowsiness, dizziness, blurred vision; to avoid rising quickly from sitting to standing (especially geriatric patients); how to manage anticholinergic effects
- The symptoms of serotonin syndrome
- To avoid alcohol, other CNS depressants
- To wear sunscreen or large hat when outdoors, photosensitivity occurs
- That contraception is recommended during treatment; to avoid breastfeeding
- To watch for suicide

TREATMENT OF OVERDOSE:

ECG monitoring, lavage; administer anticonvulsant, sodium bicarbonate

amLODIPine (Rx)

(am-loe'di-peen)

Norvasc

Func. class.: Antianginal, antihypertensive, calcium channel blocker

Chem. class.: Dihydropyridine

Do not confuse:

amLODIPine/aMILoride

ACTION: Inhibits calcium ion influx across cell membrane during cardiac depolarization; produces relaxation of coronary vascular smooth muscle, peripheral vascular smooth muscle; dilates coronary vascular arteries; increases myocardial O_2 delivery in patients with vasospastic angina

USES: Chronic stable angina pectoris, hypertension, variant angina (Prinzmetal's angina); may coadminister with other antihypertensives, antianginals

Unlabeled uses: Hypertension (pediatric patients)

CONTRAINDICATIONS:

Hypersensitivity to this product, severe aortic stenosis, severe obstructive CAD

Black Box Warning: Hypersensitivity to dihydropyridine

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, CHF, hypotension, hepatic injury

DOSAGE AND ROUTES

Coronary artery disease

- **Adult: PO** 5-10 mg/day
- **Geriatric: PO** 5 mg/day, max 10 mg/day

Hypertension

- **Adult: PO** 2.5-5 mg/day initially, max 10 mg/day
- **Geriatric: PO** 2.5 mg/day, may increase to 5 mg/day, max 10 mg/day
- **Child 6-16 yr (unlabeled): PO** 2.5-5 mg/day
- **Child <6 yr (unlabeled): PO** 0.05-0.2 mg/kg/day in 1-2 divided doses

Hepatic dose

- **Adult: PO** 2.5 mg/day; may increase to 10 mg/day (antihypertensive); 5 mg/day, may increase to 10 mg/day (antianginal)

Available forms: Tabs 2.5, 5, 10 mg

Administer:

- Once a day without regard to meals

SIDE EFFECTS

CNS: *Headache,* fatigue, dizziness, asthenia, anxiety, depression, insomnia, paresthesia, somnolence

CV: *Peripheral edema,* bradycardia, hypotension, palpitations, syncope, chest pain

GI: Nausea, vomiting, diarrhea, gastric upset, constipation, flatulence, anorexia, gingival hyperplasia, dyspepsia

GU: Nocturia, polyuria, sexual difficulties

INTEG: Rash, pruritus, urticaria, alopecia

OTHER: Flushing, muscle cramps, cough, weight gain, tinnitus, epistaxis

PHARMACOKINETICS

Peak 6-12 hr; half-life 30-50 hr; increased in geriatric patients, hepatic disease; metabolized by liver (CYP3A4); excreted in urine (90% as metabolites); protein binding >93%

INTERACTIONS

Increase: neurotoxicity—lithium

Increase: hypotension—alcohol, antihypertensives, nitrates, fentaNYL, quiNIDine

Increase: amLODIPine level—diltiazem

Decrease: antihypertensive effect—NSAIDs

Drug/Herb

Decrease: effect—yohimbe

Drug/Food

Increase: hypotensive effect—grapefruit juice

NURSING CONSIDERATIONS

Assess:

- Cardiac status: B/P, pulse, respirations, ECG; some patients have developed severe angina, acute MI after calcium channel blockers if obstructive CAD is severe
- Peripheral edema, dyspnea, jugular vein distention, crackles
- **Angina:** intensity, location, duration of pain

Evaluate:

- Therapeutic response: decreased anginal pain, decreased B/P, increased exercise tolerance

Teach patient/family:

- To take product as prescribed, not to double or skip dose
- To avoid hazardous activities until stabilized on product, dizziness is no longer a problem
- To avoid OTC products unless directed by prescriber
- To comply in all areas of medical regimen: diet, exercise, stress reduction, product therapy, smoking cessation
- To notify prescriber of irregular heartbeat; shortness of breath; swelling of feet, face, hands; severe dizziness; constipation; nausea; hypotension; if chest pain

does not improve, use nitroglycerin when angina is severe
- To use correct technique when monitoring pulse; to contact prescriber if pulse <50 bpm
- To avoid large amounts of grapefruit juice, alcohol
- To change positions slowly to prevent orthostatic hypotension
- To continue with good oral hygiene to prevent gingival disease
- To use sunscreen, protective clothing to prevent photosensitivity
- To notify all health care providers of use of this product

TREATMENT OF OVERDOSE:
Defibrillation, β-agonists, IV calcium inotropic agents, diuretics, atropine for AV block, vasopressor for hypotension

amoxicillin (Rx)
(a-mox-i-sill'in)

Moxatag

Func. class.: Antiinfective, antiulcer

Chem. class.: Aminopenicillin

Do not confuse:
amoxicillin/amoxapine/Amoxil
Trimox/Diamox/Tylox
Wymox/Tylox

ACTION:
Interferes with cell wall replication of susceptible organisms; the cell wall, rendered osmotically unstable, swells and bursts from osmotic pressure; bactericidal: lysis mediated by bacterial cell wall autolysins

USES:
Treatment of skin, respiratory, GI, GU infections, otitis media, gonorrhea; for gram-positive cocci *(Staphylococcus aureus, Streptococcus pyogenes, Streptococcus faecalis, Streptococcus pneumoniae)*, gram-negative cocci *(Neisseria gonorrhoeae, Neisseria meningitidis)*, gram-positive bacilli *(Corynebacterium diphtheriae, Listeria monocytogenes)*, gram-negative bacilli *(Haemophilus influenzae, Escherichia coli, Proteus mirabilis, Salmonella)*; β-lactase–negative organisms; prophylaxis of bacterial endocarditis; in combination with other products for treatment of *Helicobacter pylori*

Unlabeled uses: Lyme disease, anthrax treatment and prophylaxis, cervicitis, *Chlamydia trachomatis*, dental abscess/infection, dyspepsia, gastric ulcer, nongonococcal urethritis, periodontitis, typhoid fever

CONTRAINDICATIONS:
Hypersensitivity to penicillins

Precautions: Pregnancy (B), breastfeeding, neonates, hypersensitivity to cephalosporins, severe renal disease, acute lymphocytic leukemia, mononucleosis, phenylketonuria

DOSAGE AND ROUTES

Systemic infections (severe)
- **Adult: PO** 750 mg-1.75 g/day in divided doses q8hr or q12hr
- **Child: PO** 20-50 mg/kg/day in divided doses q8hr or q12hr

***S. pyogenes* infection (pharyngitis/tonsillitis)**
- **Adult/child >12 yr: PO EXT REL** 775 mg every day with meal × 10 days

Gonorrhea
- **Adult: PO** 3 g given with 1 g probenecid as a single dose followed by tetracycline or erythromycin therapy

C. trachomatis
- **Adult: PO** 500 mg/tid × 1 wk

Bacterial endocarditis prophylaxis (unlabeled)
- **Adult: PO** 2 g 1 hr before procedure
- **Child: PO** 50 mg/kg 1 hr before procedure; max 2 g

Renal disease
- **Adult: PO** CCr 10-30 ml/min 250-500 mg q12hr; CCr <10 ml/min 250-500 mg q24hr; do not use 775, 875 mg strength if CCr <30 ml/min

Lyme disease (unlabeled)
- **Adult: PO** 250-500 mg tid × 10-30 days
- **Child: PO** 20-50 mg/kg/day in divided doses q8hr × 10-30 days

Duodenal/gastric ulcer/dyspepsia from *H. pylori* infection (unlabeled)
• **Adult: PO** 1000 mg bid with lansoprazole or clarithromycin/omeprazole
Anthrax treatment/prophylaxis (unlabeled)
• **Adult and child >20 kg: PO** 500 mg q8hr × 10-14 days (prophylaxis), 60 days (treatment)
• **Child <20 kg: PO** 80 mg/kg divided in 3 doses q8hr × 60 days (treatment)
Available forms: Caps 250, 500 mg; chew tabs 125, 200, 250, 400 mg; tabs 250, 500, 875 mg; ext rel tab (Moxatag) 775 mg; susp 125, 200, 250, 400 mg/5 ml
Administer:
PO route
• **Susp:** shake well before each dose; may be used alone, mixed in drinks; use immediately; discard unused portion after 14 days, store in refrigerator
• Give around the clock; caps may be emptied, mixed with liquids if needed without regard to food
• **Ext rel:** do not crush, chew, break, take with food

SIDE EFFECTS

CNS: Headache, seizures, agitation, confusion, dizziness, insomnia
GI: *Nausea, vomiting, diarrhea,* increased AST, ALT, abdominal pain, glossitis, colitis, pseudomembranous colitis, jaundice, cholestasis
HEMA: Anemia, increased bleeding time, bone marrow depression, granulocytopenia, hemolytic anemia
INTEG: *Urticaria, rash*
SYST: Anaphylaxis, respiratory distress, serum sickness, Stevens-Johnson syndrome, toxic epidermal necrolysis, exfoliative dermatitis

PHARMACOKINETICS

PO: Peak 2 hr, duration 6-8 hr, half-life 1-1⅓ hr, metabolized in liver, excreted in urine, crosses placenta, enters breast milk

INTERACTIONS

Increase: rash—allopurinol
Increase: amoxicillin level—probenecid
Increase: anticoagulant action—warfarin
Increase: methotrexate levels—methotrexate
Decrease: effectiveness of oral contraceptives
Drug/Lab Test
Increase: AST/ALT, alk phos, LDH
False positive: direct Coombs's test

NURSING CONSIDERATIONS

Assess:
• Report hematuria, oliguria, penicillin products, in high doses are nephrotoxic
• Hepatic studies: AST, ALT
• Blood studies: WBC, RBC, Hgb, Hct, bleeding time
• Renal studies: urinalysis, protein, blood, BUN, creatinine
• C&S before product therapy; product may be given as soon as culture is taken
⚠ **Pseudomembranous colitis:** bowel pattern before, during treatment; diarrhea, cramping, blood in stools; report to prescriber
• Skin eruptions after administration of penicillin to 1 wk after discontinuing product, rash is more common if allopurinol is taken concurrently
⚠ **Anaphylaxis:** rash, itching, dyspnea, facial/laryngeal edema
Perform/provide:
• Scratch test to assess allergy after securing order from prescriber; usually done when penicillin is only product of choice
Evaluate:
• Therapeutic response: absence of infection; prevention of endocarditis, resolution of ulcer symptoms
Teach patient/family:
• That caps may be opened, contents taken with fluids; that chewable form is available; to take as prescribed, not to double dose

• All aspects of product therapy: to complete entire course of medication to ensure organism death (10-14 days); that culture may be taken after completed course of medication

⚠ To report sore throat, fever, fatigue, diarrhea **(superinfection or agranulocytopenia),** blood in stool, abdominal pain **(pseudomembranous colitis),** decreased urinary output

• That product must be taken in equal intervals around the clock to maintain blood levels; to take without regard to food

• To wear or carry emergency ID if allergic to penicillins

TREATMENT OF ANAPHYLAXIS: Withdraw product, maintain airway; administer EPINEPHrine, aminophylline, O_2, IV corticosteroids

amoxicillin/clavulanate (Rx)

(a-mox-i-sill'in)

Amoclan, Apo-Amoxi Clav ♣, Augmentin, Augmentin XR, Clavulin ♣

Func. class.: Broad-spectrum antiinfective

Chem. class.: Aminopenicillin β-lactamase inhibitor

Do not confuse:
Augmentin/amoxicillin

ACTION: Bacteriocidal, interferes with cell wall replication of susceptible organisms; the cell wall, rendered osmotically unstable, swells and bursts from osmotic pressure; lysis mediated by bacterial cell wall autolytic enzymes, combination increases spectrum of activity against β-lactamase–resistant organisms

USES: Lower respiratory tract infections, sinus infections, pneumonia, otitis media, skin infection, UTI; effective for strains of *Escherichia coli, Proteus mirabilis, Haemophilus influenzae, Streptococcus faecalis, Streptococcus pneumoniae,* and some β-lactamase–producing organisms

Unlabeled uses: Actinomycotic mycetoma, chancroid, dental infections, dentoalveolar infection, melioidosis, pericoronitis, SARS

CONTRAINDICATIONS: Hypersensitivity to penicillins, severe renal disease, dialysis, jaundice

Precautions: Pregnancy (B), breastfeeding, neonates, children, hypersensitivity to cephalosporins; renal/GI disease, asthma, colitis, diabetes, eczema, leukemia, mononucleosis, viral infections, phenylketonuria

DOSAGE AND ROUTES

• **Adult: PO** 250-500 mg q8hr or 500-875 mg q12hr, depending on severity of infection

• **Child ≤40 kg: PO** 20-90 mg/kg/day in divided doses q8-12hr

Renal disease

• **Adult: PO** CCr 10-30 ml/min dose q12hr; CCr <10 ml/min dose q24hr; do not use 875-mg strength or ext rel if CCr <30 ml/min; Augmentin XR is contraindicated with renal disease

Available forms: Tabs 250, 500, 875 mg/125 mg clavulanate; chew tabs 200/28.5, 400/57 mg; powder for oral susp 250/28.5, 200/28.5, 400/57, 600/42.9 mg/5 ml; ext rel tabs (XR) 1000 mg amoxicillin, 62.5 mg clavulanate; powder for oral susp (ES) 600 mg amoxicillin, 42.9 mg clavulanate

Administer:

PO route

• Do not break, crush, chew XR (ext rel) product

⚠ Only as directed; two 250-mg tabs not equivalent to one 500-mg tab due to strength of clavulanate

• Shake susp well before each dose; may be used alone, mixed in drinks; use im-

mediately, discard unused portion of susp after 14 days, store in refrigerator
• Give around the clock
• Give with light meal for increased absorption

SIDE EFFECTS

CNS: Headache, fever, seizures, agitation, insomnia
GI: *Nausea, diarrhea, vomiting,* increased AST/ALT, abdominal pain, glossitis, colitis, black tongue, pseudomembranous colitis
GU: Oliguria, proteinuria, hematuria, *vaginitis, moniliasis,* glomerulonephritis
HEMA: Anemia, bone marrow depression, granulocytopenia, leukopenia, eosinophilia, thrombocytopenic purpura
INTEG: *Rash,* urticaria, dermatitis, toxic epidermal necrolysis
META: Hypo/hyperkalemia, alkalosis, hypernatremia
SYST: Anaphylaxis, respiratory distress, serum sickness, superinfection, Stevens-Johnson syndrome, candidiasis

PHARMACOKINETICS

PO: Peak 2 hr, duration 6-8 hr, half-life 1-1⅓ hr, metabolized in liver, excreted in urine, crosses placenta, excreted in breast milk, removed by hemodialysis

INTERACTIONS

Increase: amoxicillin levels—probenecid
Increase: anticoagulant effect—warfarin
Increase: skin rash—allopurinol
Decrease: action of oral contraceptives
Drug/Food
Decrease: absorption by a high-fat meal
Drug/Lab Test
Increase: AST/ALT, alk phos, LDH
False positive: direct Coombs's test

NURSING CONSIDERATIONS

Assess:
⚠ Nephrotoxicity at high doses: I&O ratio; report hematuria, oliguria
• Hepatic studies: AST, ALT
• Blood studies: WBC, RBC, Hgb, Hct, bleeding time
• Renal studies: urinalysis, protein, blood, BUN, creatinine; if urine output decreases, long-acting products should not be used
• C&S before product therapy; product may be given as soon as culture is taken
⚠ **Pseudomembranous colitis:** bowel pattern before, during treatment; diarrhea, cramping, blood in stools; report to prescriber
⚠ **Anaphylaxis:** rash, itching, dyspnea, facial/laryngeal edema; skin eruptions after administration of penicillin to 1 wk after discontinuing product
Perform/provide:
• Adrenaline, suction, tracheostomy set, endotracheal intubation equipment on unit
• Adequate intake of fluids (2 L) during diarrhea episodes
• Scratch test to assess allergy after securing order from prescriber; usually done when penicillin is only product of choice
• Storage in refrigerator for 10 days
Evaluate:
• Therapeutic response: absence of infection
Teach patient/family:
• To take as prescribed, not to double dose
• All aspects of product therapy: to complete entire course of medication to ensure organism death (10-14 days); that culture may be taken after completed course of medication
⚠ To report sore throat, fever, fatigue **(superinfection or agranulocytosis);** diarrhea, cramping, blood in stools **(pseudomembranous colitis)**
• That product must be taken in equal intervals around the clock to maintain blood levels
• To wear or carry emergency ID if allergic to penicillins

TREATMENT OF HYPERSENSITIVITY: Withdraw product, maintain airway, administer EPINEPHrine, aminophylline, O_2, IV corticosteroids for anaphylaxis

amphotericin B lipid complex

(am-foe-ter'i-sin)

Abelcet

Func. class.: Antifungal

Chem. class.: Amphoteric polyene

ACTION: Increases cell membrane permeability in susceptible fungi by binding sterols; alters cell membrane, thereby causing leakage of cell components, cell death

USES: Indicated for the treatment of invasive fungal infections in patients who cannot tolerate or have failed conventional amphotericin B therapy; broad-spectrum activity against many fungal, yeast and mold pathogen infections, including Aspergillus, Zygomycetes, Fusarium, Cryptococcus, and many hard-to-treat Candida species; Aspergillus fumigatus, Aspergillus sp., Blastomyces dermatitidis, Candida albicans, Candida guilliermondii, Candida sp., Candida stellatoidea, Candida tropicalis, Coccidioides immitis, Cryptococcus sp., Histoplasma sp.

CONTRAINDICATIONS: Hypersensitivity, severe bone marrow depression

DOSAGE AND ROUTES

• **Adult: IV** 5 mg/kg/day as a single inf given at 2.5 mg/kg/hr

Available forms: Susp for inj 100 mg/20-ml vial

Administer:

⚠ Do not confuse four different types; these are not interchangeable: conventional amphotericin B, amphotericin B cholesteryl, amphotericin B lipid complex, amphotericin B liposome

IV route

• Give product only after C&S confirms organism, product needed to treat condition; make sure product is used for life-threatening infections

• Handle with aseptic technique because amphotericin B lipid complex (ABLC) does not contain any preservatives; visually inspect parenteral products for particulate matter and discoloration before use

Filtration and dilution:

• Prepare the admixture for infusion by first shaking the vial until there is no evidence of yellow sediment on the bottom of the vial.

• Transfer the appropriate amount of drug from the required number of vials into one or more sterile syringes using an 18-gauge needle.

• Attach the provided 5-micron filter needle to the syringe; inject the syringe contents through the filter needle, into an IV bag containing the appropriate amount of D5W injection. Each filter needle may be used on the contents of no more than four 100-mg vials.

• The suspension must be diluted with D5W injection to a final concentration of 1 mg/ml. For pediatric patients and patients with cardiovascular disease, the final concentration may be 2 mg/ml. DO NOT USE SALINE SOLUTIONS OR MIX WITH OTHER DRUGS OR ELECTROLYTES.

• The diluted ready-for-use admixture is stable for up to 48 hr at 2-8 degrees C (36-46 degrees F) and an additional 6 hr at room temperature. Do not freeze.

IV INF:

• Flush IV line with D_5W injection before use or use a separate IV line; DO NOT USE AN IN-LINE FILTER.

• Before infusion, shake the bag until the contents are thoroughly mixed; max rate 2.5 mg/kg/hr. If the infusion time exceeds 2 hr, mix the contents by shaking the infusion bag every 2 hr.

Y-site compatibilities: anidulafungin, ertapenem, octreotide

SIDE EFFECTS

CNS: *Headache, fever, chills,* peripheral nerve pain, paresthesias, peripheral neuropathy, seizures, dizziness
CV: Bradycardia, hypotension, cardiac arrest
EENT: Tinnitus, deafness, diplopia, blurred vision
GI: *Nausea, vomiting, anorexia,* diarrhea, cramps, hemorrhagic gastroenteritis, acute liver failure
GU: *Hypokalemia,* azotemia, hyposthenuria, renal tubular acidosis, nephrocalcinosis, permanent renal impairment, anuria, oliguria
HEMA: Normochromic, normocytic anemia, thrombocytopenia, agranulocytosis, leukopenia, eosinophilia, hyponatremia, hypomagnesemia
INTEG: *Burning, irritation,* pain, necrosis at inj site with extravasation, flushing, dermatitis
MS: Arthralgia, myalgia, generalized pain, weakness, weight loss
SYST: Toxic epidermal neurolysis, exfoliative dermatitis, anaphylaxis

PHARMACOKINETICS

IV: Peak 1-2 hr; initial half-life (LAmB) mean 4-6 days; metabolized in liver; excreted in urine (metabolites), breast milk; protein binding 90%; poorly penetrates CSF, bronchial secretions, aqueous humor, muscle, bone; terminal half-life lipid complex mean 7 days

INTERACTIONS

Increase: nephrotoxicity—other nephrotoxic antibiotics (aminoglycosides, CISplatin, vancomycin, cycloSPORINE, polymyxin B)
Increase: hypokalemia—corticosteroids, digoxin, skeletal muscle relaxants, thiazides

NURSING CONSIDERATIONS

A

Assess:
- VS every 15-30 min during first inf; note changes in pulse, B/P
- I&O ratio; watch for decreasing urinary output, change in specific gravity; discontinue product to prevent permanent damage to renal tubules
- Blood studies: CBC, potassium, sodium, calcium, magnesium every 2 wk; BUN, creatinine 2-3 ×/wk
- Weight weekly; if weight increases by more than 2 lb/wk, edema is present; renal damage should be considered
- **For renal toxicity:** increasing BUN, serum creatinine; if BUN is >40 mg/dl or if serum creatinine is >3 mg/dl, product may be discontinued, dosage reduced
- **For hepatotoxicity:** increasing AST, ALT, alk phos, bilirubin
- For allergic reaction: dermatitis, rash; product should be discontinued, antihistamines (mild reaction) or EPINEPHrine (severe reaction) should be administered
- For hypokalemia: anorexia, drowsiness, weakness, decreased reflexes, dizziness, increased urinary output, increased thirst, paresthesias
- For ototoxicity: tinnitus (ringing, roaring in ears), vertigo, loss of hearing (rare)

Perform/provide:
- Prior to dilution, store at 2°-8° C (36°-46° F), protected from moisture and light; do not freeze; the diluted, ready-for-use admixture is stable for up to 48 hours at 2°-8° C (36°-46° F) and an additional 6 hours at room temperature; do not freeze

Evaluate:
- Therapeutic response: decreased fever, malaise, rash, negative C&S for infecting organism

Teach patient/family:
- That long-term therapy may be needed to clear infection (2 wk-3 mo, depending on type of infection)
- To notify prescriber of bleeding, bruising, or soft-tissue swelling

amphotericin B liposomal (LAmB)

(am-foe-ter'i-sin)

AmBisome

Func. class.: Antifungal

Chem. class.: Amphoteric polyene

ACTION: Increases cell membrane permeability in susceptible fungi by binding to membrane sterols; alters cell membrane, thereby causing leakage of cell components, cell death

THERAPEUTIC OUTCOME

Resolution of infection

USES: Empirical therapy for presumed fungal infection in febrile neutropenic patients; treatment of *Cryptococcal* Meningitis in HIV-infected patients; treatment of *Aspergillus* species, *Candida* species and/or *Cryptococcus* species infections refractory to amphotericin B deoxycholate, or in patients where renal impairment or unacceptable toxicity precludes the use of amphotericin B deoxycholate *(Aspergillus flavus, Aspergillus fumigatus, Blastomyces dermatitidis, Candida albicans, Candida krusei, Candida lusitaniae, Candida parapsilosis, Candida tropicalis, Cryptococcus neoformans)*; treatment of visceral leishmaniasis

CONTRAINDICATIONS:

Hypersensitivity, severe bone marrow depression

DOSAGE AND ROUTES

Visceral leishmaniasis

• **Adult and child ≥1 mo: IV** 3 mg/kg every 24 hr days 1-5, and days 14, 21 (immunocompetent), 4 mg/kg every 24 hr days 1-5, and days 10, 17, 24, 31, 38 (immunocompromised)

Cryptococcal meningitis in HIV

• **Adult and child ≥1 mo: IV** 6 mg/kg/day

Fungal infection, empirical

• **Adult and child ≥1 mo: IV** 3 mg/kg/day

Fungal infection, systemic

• **Adult and child ≥1 mo: IV** 3-5 mg/kg/day

Available forms: Powder for inj 50-mg vial

Administer

⚠ Do not confuse four different types; these are not interchangeable: conventional amphotericin B, amphotericin B cholesteryl, amphotericin B lipid complex, amphotericin B liposome

IV route

• Give only after C&S confirms organism, product needed to treat condition; make sure product is used for life-threatening infections

• Administer by IV infusion only; handle with aseptic technique as LAmB does not contain any preservatives

• Visually inspect products for particulate matter and discoloration

Reconstitution

• LAmB *must* be reconstituted using sterile water for injection (without a bacteriostatic agent). DO NOT RECONSTITUTE WITH SALINE OR ADD SALINE TO THE RECONSTITUTED SUSPENSION, DO NOT MIX WITH OTHER DRUGS; doing so can cause a precipitate to form.

• Reconstitute vials containing 50 mg of LAmB /12 ml of sterile water (4 mg/ml).

• Immediately after the addition of water, SHAKE THE VIAL VIGOROUSLY for 30 sec; the suspension should be yellow and translucent. Visually inspect vial for particulate matter and continue shaking until product is completely dispersed.

• Store suspension for up to 24 hours refrigerated if using sterile water for injection; do not freeze.

Filtration and dilution

• Calculate the amount of reconstituted (4 mg/ml) suspension to be further diluted and withdraw this amount into a sterile syringe.

• Attach the provided 5-micron filter to the syringe; inject the syringe contents through the filter, into the appropriate

amount of D_5W injection. Use only one filter per vial.

• The suspension must be diluted with D_5W injection to a final concentration of 1-2 mg/ml before administration. For infants and small children, lower concentrations (0.2-0.5 mg/ml) may be appropriate to provide sufficient volume for infusion.

• Use injection of LAmB within 6 hr of dilution with D5W

IV INF

• Flush intravenous line with D5W injection before infusion. If this cannot be done, then a separate IV line must be used.

• An inline membrane filter may be used provided the mean pore diameter of the filter is not less than 1 micron.

• Administer by IV infusion using a controlled infusion device over a period of approximately 120 min. Infusion time may be reduced to approximately 60 min in patients who tolerate the infusion. If discomfort occurs during infusion, the duration of infusion may be increased.

Acetaminophen and diphenhydrAMINE

• 30 min before inf to reduce fever, chills, headache

• Storage protected from moisture and light; diluted solution is stable for 24 hr at room temp

Y-site compatibilities:

Acyclovir, amifostine, aminophylline, anidulafungin, atropine, azithromycin, bivalirudin, bumetanide, buprenorphine, busulfan, butorphanol, CARBOplatin, carmustine, ceFAZolin, ceFOXitin, ceftizoxime, cefTRIAXone, cefuroxime, cimetidine, clindamycin, cyclophosphamide, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, dexmedetomidine, diphenhydrAMINE, doxacurium, enalaprilat, ePHEDrine, EPINEPHrine, eptifibatide, ertapenem, esmolol, etoposide, famotidine, fenoldopam, fentaNYL, fludarabine, fluorouracil, fosphenytoin, furosemide, granisetron, haloperidol, heparin, hydrocortisone, HYDROmorphone, ifosfamide, isoproterenol, ketorolac, levorphanol, lidocaine, linezolid, mesna, methotrexate, methylPREDNISolone, metoprolol, milrinone, mitoMYcin, nesiritide, nitroglycerin, nitroprusside, octreotide, oxaliplatin, oxytocin, palonosetron, pancuronium, pantoprazole, PEMEtrexed, PENTobarbital, PHENObarbital, phenylephrine, piperacillin/tazobactam, potassium chloride, procainamide, ranitidine, SUFentanil, tacrolimus, theophylline, thiopental, thiotepa, ticarcillin/clavulanate, tigecycline, trimethoprim-sulfamethoxazole, vasopressin, vinCRIStine, voriconazole, zidovudine

SIDE EFFECTS

CNS: *Headache, fever, chills,* peripheral nerve pain, paresthesias, peripheral neuropathy, seizures, dizziness

CV: Bradycardia, hypotension, cardiac arrest

EENT: Tinnitus, deafness, diplopia, blurred vision

GI: *Nausea, vomiting, anorexia,* diarrhea, cramps, hemorrhagic gastroenteritis, acute liver failure

GU: *Hypokalemia,* azotemia, hyposthenuria, renal tubular acidosis, nephrocalcinosis, permanent renal impairment, anuria, oliguria

HEMA: Normochromic normocytic anemia, thrombocytopenia, agranulocytosis, leukopenia, eosinophilia, hyponatremia, hypomagnesemia

INTEG: *Burning, irritation,* pain, necrosis at inj site with extravasation, flushing, dermatitis, skin rash (topical route)

MS: Arthralgia, myalgia, generalized pain, weakness, weight loss

SYST: Stevens–Johnson syndrome, toxic epidermal neurolysis, exfoliative dermatitis, anaphylaxis

PHARMACOKINETICS

IV: Peak 1-2 hr; initial half-life (LAmB) mean 4-6 days; metabolized in liver; excreted in urine (metabolites), breast milk; protein binding 90%; poorly penetrates CSF, bronchial secretions, aqueous humor, muscle, bone; terminal half-life mean 4-6 days

INTERACTIONS

Increase: Nephrotoxicity—other nephrotoxic antibiotics (aminoglycosides, CISplatin, vancomycin, cycloSPORINE, polymyxin B)

Increase: Hypokalemia—corticosteroids, digoxin, skeletal muscle relaxants, thiazides

NURSING CONSIDERATIONS

Assess:

- VS every 15-30 min during first inf; note changes in pulse, B/P
- I&O ratio; watch for decreasing urinary output, change in specific gravity; discontinue product to prevent permanent damage to renal tubules
- Blood studies: CBC, potassium, sodium, calcium, magnesium every 2 wk, BUN, creatinine 2-3 ×/wk
- Weight weekly; if weight increases by more than 2 lb/wk, edema is present; renal damage should be considered
- **For renal toxicity:** increasing BUN, serum creatinine; if BUN is >40 mg/dl or if serum creatinine is >3 mg/dl, product may be discontinued, dosage reduced
- **For hepatotoxicity:** increasing AST, ALT, alk phos, bilirubin
- **For allergic reaction:** dermatitis, rash; product should be discontinued, antihistamines (mild reaction) or EPINEPHrine (severe reaction) administered
- **For hypokalemia:** anorexia, drowsiness, weakness, decreased reflexes, dizziness, increased urinary output, increased thirst, paresthesias
- **For ototoxicity:** tinnitus (ringing, roaring in ears), vertigo, loss of hearing (rare)

Evaluate:

- Therapeutic response: decreased fever, malaise, rash, negative C&S for infecting organism

Teach patient/family:

- That long-term therapy may be needed to clear infection (2 wk-3 mo, depending on type of infection)
- To notify prescriber of bleeding, bruising, or soft-tissue swelling

ampicillin (Rx)

(am-pi-sill'in)

Func. class.: Antiinfective—broad-spectrum

Chem. class.: Aminopenicillin

Do not confuse:
Omnipen/imipenem

ACTION: Interferes with cell wall replication of susceptible organisms; the cell wall, rendered osmotically unstable, swells, bursts from osmotic pressure; lysis mediated by cell wall autolysins

USES: Effective for gram-positive cocci *(Staphylococcus aureus, Streptococcus pyogenes, Streptococcus faecalis, Streptococcus pneumoniae)*, gram-negative cocci *(Neisseria meningitidis)*, gram-negative bacilli *(Haemophilus influenzae, Proteus mirabilis, Salmonella, Shigella, Listeria monocytogenes)*, gram-positive bacilli; meningitis, GI/GU/respiratory infections, endocarditis, septicemia, otitis media

Unlabeled uses: Biliary tract infection, shigellosis, typhoid fever, PID, OB/GYN infections, leptospirosis

CONTRAINDICATIONS: Hypersensitivity to penicillins, antimicrobial resistance

Precautions: Pregnancy (B), breastfeeding, neonates, hypersensitivity to cephalosporins, renal disease, mononucleosis

DOSAGE AND ROUTES

Systemic infections

- **Adult and child ≥40 kg: PO** 250-500 mg q6hr; **IV/IM** 2-8 g/day in divided doses q4-6hr
- **Child <40 kg: PO** 50-100 mg/kg/day in divided doses q6-8hr; **IV/IM** 100-200 mg/kg/day in divided doses q6-8hr

Bacterial meningitis

- **Adult and adolescent: IM/IV** 150-200 mg/kg/day in divided doses q3-4hr; IDSA dose IV 12 g in divided doses q4hr

• **Infant and child: IM/IV** 150-200 mg/kg/day in divided doses q3-4hr; IDSA dose IV 300 mg/kg/day in divided doses q6hr
• **Neonates >7 days and >2000 g: IM/IV** 200 mg/kg/day in divided doses q6hr; IDSA dose IV 200 mg/kg/day in divided doses q6-8hr

Gonorrhea (urethritis)
• **Adult and child ≥45 kg: PO** 3.5 g given with 1 g probenecid as a single dose (not recommended by CDC)

Prevention of bacterial endocarditis
• **Adult: IM/IV** 2 g 30 min before procedure
• **Child: IM/IV** 50 mg/kg 30 min before procedure, max 2 g

GI/GU infections other than *N. gonorrhoeae*
• **Adult and child >20 kg: PO** 250-500 mg q6hr, may use larger dose for more serious infections
• **Child ≤20 kg: PO** 50-100 mg/kg/day in divided doses q6hr

Renal disease
• **Adult and child:** CCr 10-50 ml/min extend to q6-12hr; CCr <10 ml/min extend to q12-16hr

Shigellosis in AIDS patients (unlabeled)
• **Adult: PO** 500 mg qid × 5 days (not recommended by CDC)

Typhoid fever (unlabeled)
• **Adult/adolescent/child: IV** 100 mg/kg/day in divided doses q6hr × 14 days or more

Available forms: Powder for inj 125, 250, 500 mg, 1, 2, 10 g; IV inj 500 mg, 1, 2 g; caps 250, 500 mg; powder for oral susp 125, 250/5 ml

Administer:

PO route
• On empty stomach with plenty of water for best absorption (1-2 hr before meals or 2-3 hr after meals)
• Shake susp well before each dose

IM route
• **Reconstitute** by adding 0.9-1.2 ml/125-mg vial; 0.9-1.9 ml/250-mg vial; 1.2-1.8 ml/500-mg vial; 2.4-7.4 ml/1-g vial; 6.8 ml/2-g vial

IV route
• **IV direct:** after diluting with sterile water 0.9-1.2 ml/125 mg product, administer over 3-5 min (up to 500 mg), 10-15 min (>500 mg)

Intermittent IV INF route
• May be diluted in 50 ml or more of D_5W, D_5 0.45% NaCl to a conc of 30 mg/ml or less; IV sol is stable for 1 hr; give at prescribed rate, do not give in same tubing as aminoglycosides, separate by ≥1 hr

Y-site compatibilities: Acyclovir, alprostadil, amifostine, aminocaproic acid, anidulafungin, atenolol, bivalirudin, bleomycin, CARBOplatin, CISplatin, clarithromycin, cyclophosphamide, DACTINomycin, DAPTOmycin, dexmedetomidine, docetaxel, doxacurium, DOXOrubicin liposome, eptifibatide, etoposide, filgrastim, fludarabine, fluorouracil, foscarnet, gatifloxacin, gemcitabine, granisetron, hetastarch, ifosfamide, irinotecan, levofloxacin, linezolid, mechlorethamine, methotrexate, metroNIDAZOLE, octreotide, ofloxacin, oxaliplatin, PACLitaxel, palonosetron, pamidronate, pancuronium, pantoprazole, PEMEtrexed, perphenazine, propofol, remifentanil, rITUXimab, rocuronium, sodium acetate, teniposide, thiotepa, tigecycline, tirofiban, TNA, trastuzumab, vinCRIStine, vit B/C, voriconazole

SIDE EFFECTS

CNS: Lethargy, hallucinations, anxiety, depression, twitching, coma, seizures
GI: *Nausea, vomiting, diarrhea,* pseudomembranous colitis, stomatitis
GU: Oliguria, proteinuria, hematuria, *vaginitis, moniliasis,* glomerulonephritis
HEMA: Anemia, increased bleeding time, bone marrow depression, granulocytopenia, leukopenia, eosinophilia, hemolysis
INTEG: *Rash, urticaria,* erythema multiforme
MISC: Anaphylaxis, serum sickness, Stevens-Johnson syndrome, toxic epidermal necrolysis

PHARMACOKINETICS

Half-life 50-110 min; metabolized in liver; excreted in urine, bile, breast milk; crosses placenta; removed by dialysis
PO: Peak 2 hr, duration 6-8 hr
IM: Peak 1 hr
IV: Peak 5 min

INTERACTIONS

Increase: bleeding, oral anticoagulants, monitor INR/PIJ
Increase: ampicillin concentrations—probenecid
Increase: ampicillin-induced skin rash—allopurinol, monitor for rash
Drug/Lab Test
Increase: AST, ALT
Decrease: conjugated estrone during pregnancy, conjugated estriol
False positive: urine glucose

NURSING CONSIDERATIONS

Assess:
• **Infection:** characteristics of wound, sputum, WBC; baseline, periodically; C&S before product therapy, product may be taken as soon as culture is taken
⚠ **Nephrotoxicity:** I&O ratio; report hematuria, oliguria; renal studies: urinalysis, protein, blood, BUN, creatinine
• Hepatic studies: AST, ALT
• Blood studies: WBC, RBC, Hgb, Hct, bleeding time
• Bowel pattern before, during treatment
• Skin eruptions after administration of penicillin to 1 wk after discontinuing product; identify allergies before using
• Respiratory status: rate, character, wheezing, tightness in chest
⚠ **Anaphylaxis:** rash, itching, dyspnea, facial swelling; stop product, notify prescriber, have emergency equipment available
Perform/provide:
• Adequate intake of fluids (2 L) during diarrhea episodes
• Scratch test to assess allergy after securing order from prescriber; usually done when penicillin is only product of choice
• Storage in tight container; after reconstituting, oral suspension refrigerated for 2 wk or stored at room temp for 1 wk
Evaluate:
• Therapeutic response: absence of fever, draining wounds, other symptoms of infection
Teach patient/family:
• That tabs may be crushed; caps may be opened, mixed with water
• To take oral ampicillin on empty stomach with full glass of water
• All aspects of product therapy: to complete entire course of medication to ensure organism death (10-14 days); that culture may be taken after completed course of medication
⚠ To report sore throat, fever, fatigue, diarrhea (may indicate **superinfection**); to report rash, other signs of allergy
• That product must be taken in equal intervals around the clock to maintain blood levels
• To wear or carry emergency ID if allergic to penicillins
• **Pseudomembranous colitis:** diarrhea with blood or pus; notify prescriber

TREATMENT OF ANAPHYLAXIS: Withdraw product, maintain airway; administer EPINEPHrine, aminophylline, O_2, IV corticosteroids

ampicillin, sulbactam (Rx)

Unasyn

Func. class.: Antiinfective—broad-spectrum

Chem. class.: Aminopenicillin with β-lactamase inhibitor

ACTION: Interferes with cell wall replication of susceptible organisms; the cell wall, rendered osmotically unstable, swells, bursts from osmotic pressure; lysis due to cell wall autolytic enzymes; combination extends spectrum of activity by β-lactamase inhibition

USES: Skin infections, intraabdominal infections, pneumonia *(Staphylococcus aureus, Escherichia coli, Klebsiella, Proteus mirabilis, Bacteroides fragilis, Haemophilus influenzae, Enterobacter, Acinetobacter calcoaceticus)*, intraabdominal infections *(Enterobacter, Klebsiella, Bacteroides, E. coli)*, gynecologic infections *(E. coli, Bacteroides)*, meningitis, septicemia

Unlabeled uses: Aspiration pneumonia, bone/joint infections, gonorrhea, infectious arthritis, lower respiratory infections, osteomyelitis, PID, UTI

CONTRAINDICATIONS: Hypersensitivity to penicillins, ampicillin, sulbactam

Precautions: Pregnancy (B), breastfeeding, neonates, hypersensitivity to cephalosporins/carbapenems, renal disease, mononucleosis, viral infections, syphilis

DOSAGE AND ROUTES

- **Adult/adolescent/child ≥40 kg: IM/IV** 1.5-3 g q6hr, max 4 g/day sulbactam
- **Child ≤40 kg: IV** 150-300 mg/kg/day divided q6hr, max 4 g/day

Renal disease

- **Adult ≥40 kg: IM/IV** CCr 15-30 ml/min dose q12hr; CCr 5-15 ml/min dose q24hr

Available forms: Powder for inj 1.5 g (1 g ampicillin, 0.5 g sulbactam), 3 g (2 g ampicillin, 1 g sulbactam), 10 g (10 g ampicillin, 5 g sulbactam)

Administer:

IM route

- Reconstitute by adding 3.2 ml sterile water/1.5-g vial; 6.4 ml/3-g vial, give deep in large muscle, aspirate
- Do not use IM in child

Direct IV route

- After diluting 1.5 g/3.2 ml sterile water for inj or 3 g/6.4 ml (250 mg ampicillin/125 mg sulbactam), allow to stand until foaming stops; may give over 15 min

Intermittent IV INF route

- Dilute further in 50 ml or more of D_5W, NaCl; administer within 1 hr after reconstitution; give over 15-30 min, separate doses from aminoglycosides by ≥1 hr

Y-site compatibilities: Amifostine, aminocaproic acid, anidulafungin, atenolol, bivalirudin, bleomycin, CARBOplatin, cefepime, CISplatin, codeine, cyclophosphamide, cytarabine, DAPTOmycin, dexmedetomidine, docetaxel, doxacurium, eptifibatide, etoposide, fenoldopam, filgrastim, fludarabine, fluorouracil, gallium, gatifloxacin, gemcitabine, granisetron, hetastarch, irinotecan, levofloxacin, linezolid, methotrexate, metroNIDAZOLE, octreotide, oxaliplatin, PACLitaxel, palonosetron, pamidronate, pancuronium, pantoprazole, PEMEtrexed, remifentanil, riTUXimab, rocuronium, tacrolimus, teniposide, thiotepa, tigecycline, tirofiban, TNA, TPN, trastuzumab, vecuronium, vinCRIStine, voriconazole

SIDE EFFECTS

CNS: Lethargy, hallucinations, anxiety, depression, twitching, coma, seizures

GI: *Nausea, vomiting, diarrhea,* increased AST/ALT, abdominal pain, glos-

sitis, colitis, pseudomembranous colitis, hepatic necrosis/failure

GU: Oliguria, proteinuria, hematuria, *vaginitis, moniliasis,* glomerulonephritis, dysuria

HEMA: Anemia, increased bleeding time, bone marrow depression, granulocytopenia, leukopenia, eosinophilia, hemolysis

INTEG: Injection site reactions, rash, edema, urticaria

MISC: Anaphylaxis, serum sickness, toxic epidermal necrolysis, Stevens-Johnson syndrome

PHARMACOKINETICS

IV: Peak 5 min, half-life 50-110 min, little metabolized in liver, 75%-85% of both products excreted in urine, diffuses to breast milk, crosses placenta

INTERACTIONS

Increase: bleeding risk—oral anticoagulants; check, INR, PT

Increase: ampicillin-induced skin rash—allopurinol, check for rash

Increase: ampicillin level—probenecid

Increase: methotrexate level—methotrexate

Drug/Lab Test

False positive: urine glucose, urine protein

NURSING CONSIDERATIONS

Assess:

• **Infection:** characteristics of wound, sputum; take temperature, WBC count; C&S before product therapy, product may be given as soon as culture is taken

• Bowel pattern before, during treatment

• I&O ratio; report hematuria, oliguria because penicillin in high doses is nephrotoxic

⚠ Any patient with compromised renal system, because product excreted slowly with poor renal system function; toxicity may occur rapidly

• Hepatic studies: AST, ALT if on long-term therapy

• Blood studies: WBC, RBC, Hct, Hgb, bleeding time

• Renal studies: urinalysis, protein, blood, BUN, creatinine

⚠ **Anaphylaxis:** skin eruptions after administration of ampicillin to 1 wk after discontinuing product

• Allergies before treatment; reaction to each medication; report allergies

Perform/provide:

• Scratch test to assess allergy after securing order from prescriber; usually done when penicillin is only product choice

• Storage in tight container, out of light

Evaluate:

• Therapeutic response: absence of fever, draining wounds; negative C&S

Teach patient/family:

• To report superinfection: vaginal itching; loose, foul-smelling stools; black furry tongue

⚠ **Pseudomembranous colitis:** fever, diarrhea with pus, blood, mucus; may occur up to 4 wk after treatment; report immediately to health care provider

• To wear or carry emergency ID if allergic to penicillin products

TREATMENT OF ANAPHYLAXIS: Withdraw product, maintain airway; administer EPINEPHrine, aminophylline, O_2, IV corticosteroids

anakinra (Rx)

(an-ah-kin'rah)

Kineret

Func. class.: Antirheumatic (DMARD), immunomodulator

Chem. class.: Recombinant form of human interleukin-1 receptor antagonist (IL-1Ra)

Do not confuse:
Anakinra/amikacin

ACTION: A form of human interleukin-1 receptor antagonist (IL-1Ra) produced by DNA technology; blocks activity of IL-1, thereby resulting in decreased inflammation, cartilage degradation, bone resorption

USES: Reduction in signs and symptoms of moderate to severe active rheumatoid arthritis in patients ≥18 yr who have not responded to other disease-modifying agents
Unlabeled uses: Cryopyrin-associated periodic syndromes

CONTRAINDICATIONS: Hypersensitivity to *Escherichia-coli*–derived proteins, product, latex; sepsis
Precautions: Pregnancy (B), breast-feeding, children, geriatric patients, renal impairment, active infections, immunosuppression, neoplastic disease, asthma

DOSAGE AND ROUTES

• **Adult: SUBCUT** 100 mg/day
Renal dose
• **Adult:** CCr <30 ml/min **SUBCUT** 100 mg every other day
Available form: Inj 100 mg/0.67 ml prefilled glass syringe
Administer:
SUBCUT route
• Do not use if cloudy, discolored, if particulate is present; protect from light
• Do not admix with other sol or medications; do not use filter; give at same time each day
• Apply cold compress before, after inj, allow sol to warm to room temp before use
• Use middle thigh, abdomen (outside 2 inches from navel), upper outer buttocks, upper outer area of arm; rotate sites, give inj at least 1 inch from old site; do not give in skin that is bruised, red, tender, hard; remove needle cover immediately before use, pull gently back on plunger, if no blood appears, inject entire contents of prefilled syringe; discard any unused portion

SIDE EFFECTS

CNS: *Headache*
CV: Cardiac arrest
EENT: *Sinusitis*
GI: *Abdominal pain, nausea, diarrhea*
HEMA: Neutropenia
INTEG: Rash, *inj site reaction,* allergic reaction
MISC: Flulike symptoms, infection
MS: *Worsening of RA, arthralgia*
RESP: *URI*

PHARMACOKINETICS

Terminal half-life 4-6 hr; eliminated renally

INTERACTIONS

• Do not use rilonacept
Increase: risk for severe infection—TNF-blocking agents, do not use together
Decrease: antibody reactions—vaccines, avoid concurrent use

NURSING CONSIDERATIONS

Assess:
• **Rheumatoid arthritis:** pain, stiffness, ROM, swelling of joints, baseline, periodically during treatment
• For inj site pain, swelling; usually occurs after 2 inj (4-5 days)
• For infections (increased WBC, fever, flulike symptoms); stop treatment if

present, do not start if patient has active infection
- CBC with differential, neutrophil counts before treatment, monthly × 3 mo, quarterly for up to 1 yr thereafter
- For allergic reactions (rash, dyspnea); discontinue if severe
- For urinary status: decreasing urinary output

Evaluate:
- Therapeutic response: decreased inflammation, pain in joints

Teach patient/family:
- Not to receive vaccines while taking this product; to update vaccines before treatment
- About self-administration, if appropriate: inj should be made in thigh, abdomen, upper arm; rotate sites at least 1 inch from old site; give at same time of day, store in refrigerator, do not freeze
- To notify prescriber if pregnancy is planned, suspected, to avoid breastfeeding; to notify prescriber of allergic reaction, decreasing urine output, signs/symptoms of infection

⚠ HIGH ALERT

anastrozole (Rx)

(an-a-stroh'zole)

Arimidex

Func. class.: Antineoplastic

Chem. class.: Aromatase inhibitor

ACTION: Highly selective nonsteroidal aromatase inhibitor that lowers serum estradiol concentrations; many breast cancers have strong estrogen receptors

USES: Advanced breast carcinoma not responsive to other therapy in estrogen-receptor–positive patients (postmenopausal); patients with advanced disease taking tamoxifen, adjunct therapy for early breast cancer

Unlabeled uses: Uterine leiomyomata, breast cancer (in those who have received tamoxifen for 2-3 yr)

CONTRAINDICATIONS: Pregnancy (X), breastfeeding, hypersensitivity

Precautions: Children, geriatric patients, premenopausal women, osteoporosis, hepatic/cardiac disease

DOSAGE AND ROUTES

- **Adult: PO** 1 mg/day

Available forms: Tabs 1 mg

Administer:
- Give without regard to meals at same time of day

SIDE EFFECTS

CNS: *Hot flashes, headache, lightheadedness,* depression, dizziness, confusion, insomnia, anxiety, fatigue, mood changes

CV: Chest pain, *hypertension,* thrombophlebitis, *edema,* angina, MI, cerebral infarct, CVA, *vasodilation*

GI: *Nausea, vomiting,* altered taste leading to anorexia, diarrhea, constipation, abdominal pain, dry mouth

GU: Vaginal bleeding, vaginal dryness, pelvic pain, pruritus vulvae, UTI

HEMA: Leukopenia

INTEG: *Rash,* Stevens-Johnson syndrome, anemia

MISC: Hypercholesterolemia

MS: Bone pain, myalgia, *asthenia,* bone loss/osteoporosis, arthralgia, fractures

RESP: Cough, sinusitis, dyspnea, pulmonary embolism

PHARMACOKINETICS

Peak 2 hr; half-life 50 hr; excreted in feces, urine, terminal half-life 50 hr

INTERACTIONS

- Do not use with oral contraceptives, estrogen, tamoxifen, androstenedione, DHEA

Drug/Lab Test

Increase: GGT, AST, ALT, alk phos, cholesterol, LDL

NURSING CONSIDERATIONS

Assess:

- Bone mineral density, cholesterol, lipid panel, periodically

Serious skin reactions: Stevens-Johnson syndrome

- Not effective in hormone-receptor–negative disease, use only in postmenopausal women

Perform/provide:

- Storage in light-resistant container at room temp

Evaluate:

- Therapeutic response: decreased tumor size, spread of malignancy

Teach patient/family:

- To report any complaints, side effects to prescriber
- That vaginal bleeding, pruritus, hot flashes reversible after discontinuing treatment
- To report continued vaginal bleeding immediately
- That **tumor flare**—increase in size of tumor, increased bone pain—may occur and will subside rapidly; may take analgesics for pain
- To take adequate calcium and vitamin D due to risk for bone loss/fractures

anidulafungin (Rx)

(a-nid-yoo-luh-fun'jin)

Eraxis

Func. class.: Antifungal, systemic

Chem. class.: Echinocandin

ACTION: Inhibits fungal enzyme synthesis; causes direct damage to fungal cell wall

USES: Esophageal candidiasis, *Candida albicans, C. glabrata, C. parapsilosis, C. tropicalis*

Unlabeled uses: Fungal prophylaxis, disseminated candidiasis, oropharyngeal candidiasis, *Aspergillosis* sp.

CONTRAINDICATIONS: Hypersensitivity to product, other echinocandins

Precautions: Pregnancy (C), breast-feeding, children, severe hepatic disease

DOSAGE AND ROUTES

Candidemia and other *Candida* infections

- **Adult: IV** 200 mg loading dose on day 1 then 100 mg/day × 14 days or more until last positive culture

Esophageal candidiasis

- **Adult: IV** 100 mg loading dose on day 1 then 50 mg/day × 14 days, for at least 7 days after symptoms resolved

Fungal prophylaxis (unlabeled)

- **Adolescent and child 2-17 yr: IV** 1.5 mg/kg over 90 min then 0.75 mg/kg/day over 45 min × 5-28 days

Available forms: Powder for inj, lyophilized 50, 100 mg

Administer:

IV route

- ***Reconstitution:*** If dehydrated alcohol diluents supplied, use supplied diluent (dehydrated alcohol in water for inj); reconstitute each 50-mg vial/15 ml of diluents or 100-mg vial/30 ml (3.33 mg/ml); if diluents not supplied, reconstitute each 50-mg vial/15 ml sterile water for inj or 100-mg vial/30 ml of sterile water for inj (3.33 mg/ml)
- **Dilution: 200 mg loading dose inf with vials (dehydrated alcohol),** withdraw contents of 4 (50-mg reconstituted vials) or 2 (100-mg reconstituted vials)/500 ml of D_5W or NS (0.36 mg/ml); **200 mg loading dose inf with vials (sterile water for inj),** withdraw contents of 4 (50-mg reconstituted vials) or 2 (100-mg reconstituted vials)/200 ml of D_5W or NS, total volume 260 ml; **100 mg daily inf with vials (dehydrated alcohol),** withdraw contents of 1 (100-mg reconstituted vial) or 2 (50-mg reconstituted vial) and add to 250 ml D_5W or NS (0.36 mg/ml); **100 mg daily inf with vials (sterile water),** withdraw contents of 1 (100-mg reconstituted vial)

or 2 (50-mg reconstituted vials)/100 ml D_5W or NS (total volume 130 ml); **50 mg daily inf (dehydrated alcohol),** withdraw contents of 1 (50-mg reconstituted vial)/100 ml D_5W or NS final conc (0.43/ml)

- Inf rate max 1.1 mg/min (dehydrated alcohol); inf rate 1.4 mg/min (sterile water) or 84 ml/hr
- Give only as IV inf, not for IV bolus
- Do not use if cloudy or precipitated; do not admix

Y-site compatibilities: Acyclovir, alemtuzumab, alfentanil, allopurinol, amifostine, amikacin, aminocaproic acid, aminophylline, amiodarone, amphotericin B lipid complex, amphotericin B liposome, ampicillin, ampicillin sulbactam, argatroban, arsenic trioxide, atenolol, atracurium, azithromycin, aztreonam, bivalirudin, bleomycin, bumetanide, buprenorphine, busulfan, butorphanol, calcium chloride/gluconate, CARBOplatin, carmustine, caspofungin, ceFAZolin, cefepime, cefotaxime, cefoTEtan, cefOXitin, cefTAZidime, ceftizoxime, cefTRIAXone, cefuroxime, chloramphenicol, chlorproMAZINE, cimetidine, ciprofloxacin, cisatracurium, CISplatin, clindamycin, cyclophosphamide, cycloSPORINE, cytarabine, dacarbazine, DACTINomycin, DAUNOrubicin liposome, DAUNOrubicin hydrochloride, dexamethasone, dexmedetomidine, dexrazoxane, digoxin, diltiazem, diphenhydrAMINE, DOBUtamine, DOCEtaxel, dolasetron, DOPamine, doripenem, doxacurium, DOXOrubicin, DOXOrubicin liposomal, doxycycline, droperidol, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, eptifibatide, erythromycin, esmolol, etoposide, etoposide phosphate, famotidine, fenoldopam, fentaNYL, fluconazole, fludarabine, fluorouracil, foscarnet, fosphenytoin, furosemide, gallium nitrate, ganciclovir, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, haloperidol, heparin, hydrALAZINE, hydrocortisone, HYDROmorphone, hydrOXYzine, IDArubicin, ifosfamide, imipenem-cilastatin, inamrinone, insulin (regular), irinotecan, isoproterenol, ketorolac, labetalol, leucovorin, levofloxacin, lidocaine, linezolid injection, LORazepam, mannitol, mechlorethamine, melphalan, meperidine, meropenem, mesna, metaraminol, methotrexate, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, midazolam, milrinone, mitoMYcin, mitoXANtrone, mivacurium, morphine, moxifloxacin, mycophenolate mofetil, nafcillin, naloxone, nesiritide, niCARdipine, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pamidronate, pancuronium, pantoprazole, PEMEtrexed, pentamidine, pentazocine, PENTobarbital, PHENobarbital, phentolamine, phenylephrine, piperacillin-tazobactam, polymyxin B, potassium acetate/chloride, procainamide, prochlorperazine, promethazine, propranolol, quiNIDine, quinupristin-dalfopristin, ranitidine, remifentanil, rocuronium, sodium acetate, streptozocin, succinylcholine, SUFentanil, sulfamethoxazole-trimethoprim, tacrolimus, teniposide, theophylline, thiopental, thiotepa, ticarcillin, ticarcillin-clavulanate, tirofiban, tobramycin, topotecan, trimethobenzamide, vancomycin, vasopressin, vecuronium, verapamil, vinBLAStine, vinCRIStine, vinorelbine, voriconazole, zidovudine, zoledronic acid

SIDE EFFECTS

Candidemia/other *Candida* infections

CNS: Seizures, dizziness, *headache*

CV: DVT, atrial fibrillation, right bundle branch block, hypotension, sinus arrhythmia, thrombophlebitis superficial, ventricular extrasystoles, QT prolongation (rare)

GI: *Nausea, anorexia, vomiting, diarrhea, increased AST, ALT*

META: Hypokalemia

Esophageal candidiasis

CNS: *Headache*

GI: *Nausea, anorexia, vomiting, diarrhea,* hepatic necrosis
HEMA: Neutropenia, thrombocytopenia, leukopenia, coagulopathy
INTEG: *Rash,* urticaria, itching, flushing
META: Hypocalcemia, hyperglycemia, hyperkalemia, hypernatremia, hypomagnesium (rare)
MS: *Back pain, rigors*

PHARMACOKINETICS

Steady state after loading dose, distribution half-life 0.5-1 hr, terminal half-life 40-50 hr, protein binding 99%

INTERACTIONS

Increase: plasma concentrations—cycloSPORINE
Drug/Lab Test
Increase: amylase, bilirubin, CPK, creatinine, ECG, lipase, PT
Decrease: platelets, magnesium, potassium, transferase, urea

NURSING CONSIDERATIONS

Assess:
• **Infection:** clearing of cultures during treatment; obtain culture at baseline and throughout treatment; product may be started as soon as culture is taken, those with HIV pharyngeal candidiasis may need antifungals
⚠ **Blood dyscrasias (rare):** CBC (RBC, Hct, Hgb), differential, platelet count periodically; notify prescriber of results
• Hepatic studies before, during treatment: bilirubin, AST, ALT, alk phos, as needed; also uric acid
⚠ **Bleeding:** hematuria, heme-positive stools, bruising/petechiae of mucosa or orifices; blood dyscrasias can occur
• GI symptoms: frequency of stools, cramping; if severe diarrhea occurs, electrolytes may need to be given
Perform/provide:
• Store reconstituted vials at 59° F-86° F for up to 24 hr, do not freeze (dehydrated alcohol); store reconstituted vials at 36° F-46° F (sterile water) for up to 24 hr, do not freeze
Evaluate:
• Therapeutic response: decreased symptoms of *Candida* infection, negative culture
Teach patient/family:
• To notify prescriber if pregnancy is suspected, planned; use nonhormonal form of contraception while taking this product
• To avoid breastfeeding while taking this product
• To inform prescriber of renal/hepatic disease
• To report bleeding
• To report signs of infection: increased temp, sore throat, flulike symptoms
• To notify prescriber of nausea, vomiting, diarrhea, jaundice, anorexia, clay-colored stools, dark urine; hepatotoxicity may occur

A

antithymocyte

See lymphocyte immune globulin

apomorphine

(ah-poe-more'feen)
Apokyn
Func. class.: Antiparkinson agent
Chem. class.: Dopamine agonist, non-ergot

ACTION: Has similarities to dopamine that are thought to contribute to its central dopamine receptor agonist properties; exhibits a high affinity for dopamine D_4 receptors, a moderate affinity for dopamine D_2, D_3, and D_5 receptors, and a low affinity for D_1 receptors; treats erectile dysfunction by activating dopamine receptors in the hypothalamus and limbic and neural pathways to increase erections

USES: For use as rescue of "off" episodes associated with advanced Parkinson's disease

CONTRAINDICATIONS: Hypersensitivity to this product, sulfites, or benzyl alcohol, IV use, major psychotic disorder; concurrent treatment with drugs of the 5-HT_3 antagonist class (e.g., ondansetron, granisetron, alosetron)

Precautions: History of suicidal ideation or depression, CNS/respiratory depression, decreased alertness, gag reflex depression, seizures, seizure disorder, coma, asthma, emphysema, atrial fibrillation, hypertension, bradycardia, orthostatic hypotension, QT prolongation, vasovagal syncope, acute circulatory failure, orthostatic hypotension, cardiac disease, congenital heart disease, cardiac arrhythmias, cardiac depression, heart failure, shock, hepatic/renal disease, pregnancy C, breastfeeding, debilitated/geriatric patients, abrupt discontinuation

DOSAGE AND ROUTES

• **Adult:** Test dose: **SUBCUT** 0.2 ml (2 mg) (test dose) where B/P can be closely monitored (before dose and 20, 40, 60 min after); if tolerated and patient response, then begin with 0.2 ml (2 mg); may increase by 1 mg every few days, max 0.6 ml (6 mg). If the test dose of 0.2 ml (2 mg) is tolerated but the patient does not respond, give a test dose of 0.4 ml (4 mg) no sooner than 2 hr after the 0.2 ml (2 mg) test dose, where BP can be closely monitored (before dose and 20, 40, and 60 min after the dose); If the 0.4 ml (4 mg) test dose is tolerated, the starting dose should be 0.3 ml (3 mg); may be increased by 1 mg every few days as required, max 0.6 ml (6 mg). If the 0.4 ml (4 mg) test dose is not tolerated, administer a test dose of 0.3 ml (3 mg) no sooner than 2 hr after the 0.4 ml (4 mg) test dose where BP can be closely monitored (before dose and 20, 40, and 60 min after the dose). If the 0.3 ml (3 mg) test dose is tolerated, begin with 0.2 ml (2 mg); may be increased by 0.1 ml (1 mg) every few days as required, max 0.4 ml (4 mg; outpatient)

• Usual dosage: 0.3-0.6 ml (3 to 6 mg), average frequency three times a day.

Available forms: Penfill sol for inj 10 mg/ml

Administer

Subcut route

• To reduce nausea/vomiting, give trimethobenzamide × 3 days before the first dose, and continued ≥2 months of treatment

• For subcut use only; do use IM or IV

• Wash hands before and after use, skin contact can cause an allergic skin reaction

• To be used by those qualified and who have received instruction on the use

• **Dosing pen (Apokyn Pen) is dosed in ml, not mg.** The pen allows the patient's usual dose to be dialed in, even if there is not enough medicine in the pen to do so. If there is not enough medicine for the usual dose, the device must be "rearmed" and the remaining amount needed should be dialed in. This process should be avoided if possible to avoid dosage errors. Keep a record of doses used so the cartridges can be replaced as needed

• Do not inject into infected, erythematous, or irritated skin

• Double-check dosage in syringe before use

• Aspirate before injection to avoid injection into a blood vessel; inject subcut, taking care not to inject ID

• Rotate injection sites with each injection (abdomen, upper arm, thigh)

SIDE EFFECTS

CNS: Drowsiness, dizziness, flushing, hallucinations, confusion, worsening psychiatric/behavioral effects, dyskinesias, sweating

CV: Hypotension, CHF, edema, MI, cardiac arrest

GI: Nausea, vomiting, constipation or diarrhea

INTEG: Contact dermatitis, ecchymosis, injection reaction

MISC: Yawning, rhinorrhea, respiratory depression

MS: Arthralgia, back pain

PHARMACOKINETICS

Subcut: Onset 20 min, peak 20-60 min, duration 2 hr, half-life 30-60 min

INTERACTIONS

Do not use with dronedarone

Increase: Hypotension, unconsciousness—serotonin-receptor antagonists (alosetron, dolasetron, granisetron, ondansetron, palonosetron), do not use together

Increase: QT interval—antiemetics (dolasetron, ondansetron, palonosetron), other products that increase QT, can occur at high doses

Increase: Hypotension—antihypertensives, vasodilators

Decrease: Apomorphine effect—antipsychotics

NURSING CONSIDERATIONS

Assess:

- Assess for the acute, intermittent treatment of hypomobility, "off" episodes ("end-of-dose wearing off" and unpredictable "on/off" episodes) associated with advanced Parkinson's disease
- During the test dosing to determine dose titration, B/P should be closely monitored (before dose and 20, 40, and 60 min after the injection)
- Monitor for patient response to the injection (i.e., reduction in "off" episode symptoms)
- Contact the health care provider if patient's symptoms do not respond to the first dose for a particular "off" episode; do not use a second dose for that episode
- If the patient has not received an apomorphine injection in more than 1 wk, must reinstitute following the initial test dosage and titration instructions

Evaluate:

- Positive therapeutic outcome—reduction of "off" episode symptoms in Parkinson's disease

Teach patient/family:

- Not to rise quickly, fainting can occur
- To use with antiemetic, nausea and vomiting are common
- All persons involved in care, how to use subcut pen
- To report hallucinations, other psychiatric symptoms to prescriber immediately
- Not to consume alcohol or kava, CNS effects can worsen

apraclonidine ophthalmic

See Appendix B

aprepitant (Rx)

(ap-re'pi-tant)

Emend

fosaprepitant

Emend

Func. class.: Antiemetic

Chem. class.: Miscellaneous

ACTION: Selective antagonist of human substance P/neurokinin 1 (NK_1) receptors that decreases emetic reflex

USES: Prevention of nausea/vomiting associated with cancer chemotherapy (highly emetogenic/moderately emetogenic), including high-dose CISplatin; used in combination with other antiemetics; postoperative nausea/vomiting

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, hepatic disease

DOSAGE AND ROUTES

Highly emetogenic (aprepitant)

- **Adult: PO** Day 1 (1 hr before chemotherapy) aprepitant 125 mg with 12 mg dexamethasone **PO**, with 32 mg ondansetron IV; day 2 aprepitant 80 mg with 8 mg dexamethasone **PO**; day 3 aprepitant 80 mg with 8 mg dexamethasone **PO**; day 4 only dexamethasone 8 mg **PO**; **IV INF**

115 mg over 15 min, 30 min before chemotherapy as alternative to 1st dose of aprepitant on day 1 of regimen (fosaprepitant)

Moderately emetogenic

• **Adult: PO** Day 1 125 mg aprepitant with dexamethasone 12 mg **PO,** with ondansetron 8 mg **PO** × 2; days 2 and 3 80 mg aprepitant only (aprepitant); **IV INF** 115 mg over 15 min, 30 min before chemotherapy as alternative to 1st dose of aprepitant on day 1 of regimen (fosaprepitant)

Prevention of postoperative nausea/vomiting

• **Adult: PO** 40 mg within 3 hr of induction of anesthesia

Available forms: Caps 40, 80, 125 mg; powder for inj 115, 150 mg; combo pack cap 80-125 mg

Administer:

PO route

• Do not break, crush, or chew

• PO on 3-day schedule, give with full glass of water 1 hr before chemotherapy, with or without food, given with other antiemetics

Intermittent IV INF route

• Only approved as a substitute for the 1st dose of aprepitant in 3-day regimen

• **Reconstitution:** use aseptic technique; inject 5 ml 0.9% NaCl into the vial, directing stream to wall of vial to prevent foam; swirl (do not shake)

• Prepare inf bag with 110 ml NS/115 mg; 145 ml/150 mg; do not dilute, reconstitute with any divalent cations such as calcium, magnesium, including LR, Hartmann's sol

• Withdraw entire volume from vial, transfer to inf bag; total volume 115 ml (1 mg/1 ml)

• Gently invert bag 2-3 times; reconstituted sol stable for 24 hr at lower room temp or <25° C

• Visually inspect for particulates, discoloration

• Infuse over 15 min, stable for 24 hr at room temperature

SIDE EFFECTS

CNS: *Headache, dizziness,* insomnia, anxiety, depression, confusion, peripheral neuropathy

CV: Bradycardia, tachycardia, DVT, hypo/hypertension

GI: *Diarrhea, constipation,* abdominal pain, anorexia, gastritis, increased AST, ALT, *nausea,* vomiting, heartburn

GU: Increased BUN, serum creatine, proteinuria, dysuria

HEMA: Anemia, thrombocytopenia, neutropenia

INTEG: Pruritus, rash, urticaria

MISC: Asthenia, fatigue, dehydration, fever, hiccups, tinnitus, alopecia

SYST: Anaphylaxis

PHARMACOKINETICS

Absorption 60%-65%, peak 4 hr, metabolized in liver by CYP3A4 enzymes to active metabolite, half-life 9-12 hr, 95% protein bound, not excreted in kidneys, crosses blood-brain barrier

INTERACTIONS

Increase: aprepitant action—CYP3A4 inhibitors (ketoconazole, itraconazole, nefazodone, troleandomycin, clarithromycin, ritonavir, nelfinavir, diltiazem)

Increase: action of CYP3A4 substrates (pimozide, cisapride, dexamethasone, methylPREDNISolone, midazolam, ALPRAZolam, triazolam, docetaxel, PACLitaxel, etoposide, irinotecan, imatinib, ifosfamide, vinorelbine, vinBLAStine, vinCRIStine)

Decrease: aprepitant action—CYP3A4 inducers (rifampin, carBAMazepine, phenytoin)

Decrease: action of CYP2C9 substrates (warfarin, TOLBUTamide, phenytoin), oral contraceptives

Decrease: action of both products—paroxetine

Drug/Food

Decrease: effect—grapefruit juice

NURSING CONSIDERATIONS

Assess:

⚠ **For hypersensitive reactions:** pruritus, rash, urticaria, anaphylaxis

- CV status: hypo/hypertension, bradycardia, tachycardia, DVT
- For absence of nausea, vomiting during chemotherapy
- CBC, LFTs, creatinine baseline and periodically

Perform/provide:

- Storage at room temp; keep in original bottles, blisters (PO)

Evaluate:

- Therapeutic response: absence of nausea, vomiting during cancer chemotherapy

Teach patient/family:

- To report diarrhea, constipation
- To take only as prescribed; to take 1st dose 1 hr before chemotherapy
- To report all medications and herbals to prescriber before taking this medication
- To use nonhormonal form of contraception while taking this agent and for 1 mo thereafter; oral contraceptive effect may be decreased
- That those patients also taking warfarin should have clotting monitored closely during 2-wk period after administration of aprepitant
- To avoid breastfeeding

arformoterol (Rx)

(ar-for-moe'ter-ole)

Brovana

Func. class.: Long-acting adrenergic β_2-agonist, sympathomimetic, bronchodilator

Do not confuse:

Brovana/Boniva

ACTION: Causes bronchodilation by action on β_2 (pulmonary) receptors by increasing levels of cAMP, which relaxes smooth muscle; produces bronchodilation and CNS, cardiac stimulation as well as increased diuresis and gastric acid secretion; longer acting than isoproterenol

USES: Maintenance bronchospasm prevention in COPD, including chronic bronchitis, emphysema

CONTRAINDICATIONS: Hypersensitivity to sympathomimetics, product, racemic formoterol; tachydysrhyhmias, severe cardiac disease, heart block, children, monotherapy in asthma

Precautions: Pregnancy (C), breastfeeding, cardiac disorders, hyperthyroidism, diabetes mellitus, hypertension, prostatic hypertrophy, angle-closure glaucoma, seizures, hypoglycemia

Black Box Warning: Asthma-related death

DOSAGE AND ROUTES

COPD

- **Adult: NEB** 15 mcg, bid, AM, PM

Available forms: Inh sol 15 mcg/2 ml

Administer:

- By nebulization only; no dilution needed, give over 10-15 min; sol should be colorless

SIDE EFFECTS

CNS: *Tremors, anxiety,* insomnia, headache, dizziness, stimulation, *restlessness,* hallucinations, flushing, irritability

CV: Palpitations, tachycardia, hypertension, angina, hypotension, dysrhythmias, **AV block heart failure, prolonged QT supraventricular tachycardia**

EENT: Dry nose, irritation of nose, throat

GI: Heartburn, nausea, vomiting

MISC: Flushing, sweating, anorexia, bad taste/smell changes, hypokalemia, **anaphylaxis,** *hypoglycemia*

MS: Muscle cramps

RESP: Cough, wheezing, dyspnea, **bronchospasm,** dry throat

PHARMACOKINETICS

Onset 5 min; peak 1-1½ hr; duration 4-6 hr; terminal half-life (COPD) 26 hr; extensively metabolized by direct conjugation by CYP2D6, CYP2C19; crosses placenta; protein binding 52%-65%; excreted in urine 63%, feces 11%

INTERACTIONS

Increase: QT prolongation—Class IA/III antidysrthymics, MAOIs, tricyclics
Increase: severe hypotension—oxytocics
Increase: toxicity—theophylline
Increase: ECG changes/hypokalemia—potassium-losing diuretics
Increase: action of nebulized bronchodilators
Increase: action of arformoterol—tricyclics, MAOIs, other adrenergics; do not use together
Decrease: arformoterol action, asthma-related death—other β-blockers

Drug/Herb

Increase: stimulation—caffeine (cola nut, green/black tea, guarana, yerba maté, coffee, chocolate)

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Respiratory function: vital capacity, forced expiratory volume, ABGs; lung sounds, heart rate, rhythm, B/P, sputum (baseline, peak); actively deteriorating COPD may occur, a rescue inhaler should be readily available

- Whether patient has received theophylline therapy, other bronchodilators before giving dose
- Patient's ability to self-medicate
- For evidence of allergic reactions; anaphylaxis may occur
- For **paradoxical bronchospasm; hold medication, notify prescriber if bronchospasm occurs**

Perform/provide:

- Storage in refrigerator; if stored at room temp, discard after 6 wk or if past expiration date, whichever is sooner

Evaluate:

- Therapeutic response: absence of dyspnea, wheezing after 1 hr, improved airway exchange, improved ABGs

Teach patient/family:

- To use exactly as prescribed; that death has resulted from asthma with products similar to this one, to have a rescue inhaler always
- Not to use OTC medications because excess stimulation may occur
- An opened unit-dose vial should be used right away

⚠ HIGH ALERT

argatroban (Rx)

(are-ga-troe'ban)
Func. class.: Anticoagulant
Chem. class.: Thrombin inhibitor

Do not confuse:
argatroban/Aggrastat

ACTION: Direct inhibitor of thrombin, it reversibly binds to thrombin active site

USES: Anticoagulation prevention/treatment of thrombosis in heparin-induced thrombocytopenia; adjunct to percutaneous coronary intervention (PCI) in those with history of HIT
Unlabeled uses: Acute MI, DIC, use in infants/children/adolescents

CONTRAINDICATIONS: Hypersensitivity, overt major bleeding
Precautions: Pregnancy (B), breastfeeding, children, intracranial bleeding, renal function impairment, hepatic disease, severe hypertension, after lumbar puncture, spinal anesthesia, major surgery, congenital/acquired bleeding, GI ulcers

DOSAGE AND ROUTES

DVT, Pulmonary Embolism

- **Adult: CONT IV INF** 2 mcg/kg/min; adjust dose until steady-state aPTT is 1.5-

3× initial baseline, max 100 sec, max dose 10 mcg/kg/min
• **Infant/child/adolescent (unlabeled): CONT IV INF** 0.75 mcg/kg/min, monitor aPTT q2hr until stable then at least daily
Hepatic dose
• **Adult: CONT INF** 0.5 mcg/kg/min, adjust rate based on aPTT
Percutaneous coronary intervention (PCI) in HIT
• **Adult: IV INF** 25 mcg/kg/min and bolus of 350 mcg/kg given over 3-5 min, check ACT 5-10 min after bolus completed, proceed if ACT >300 sec; if ACT <300 sec, give another 150 mcg/kg **BOL**, increase inf rate to 30 mcg/kg/min, recheck ACT in 5-10 min; if ACT >450 sec, decrease inf rate to 15 mcg/kg/min, recheck ACT in 5-10 min; when ACT is therapeutic, continue for duration of procedure
Acute MI (unlabeled)
• **Adult: IV** loading dose of 100 mcg/kg over 1 min, then 1-3 mcg/kg/min
DIC (unlabeled)
• **Adult: CONT IV** 0.7 mcg/kg/min
Available forms: Inj 100 mg/ml (2.5 ml; must dilute 100-fold)
Administer:
• Avoid all IM inj that may cause bleeding
IV, direct route
• **For PCI:** 350 mg/kg bol and continuous inf of 25 mcg/kg/min; check ACT 5-10 min after bolus
Intermittent IV INF route
• **Dilute** in 0.9% NaCl, D_5, LR to a final conc of 1 mg/ml; **dilute** each 2.5-ml vial 100-fold by mixing with 250 ml of diluent, mix by repeated inversion of the diluent bag for 1 min; may briefly be slightly hazy
• Dosage adjustment may be made after review of aPTT, max 10 mcg/kg/min

SIDE EFFECTS

CNS: *Fever,* intracranial bleeding, headache
CV: Atrial fibrillation, coronary thrombosis, MI, myocardial ischemia, coronary occlusion, ventricular tachycardia, bradycardia, *chest pain, hypotension*
GI: *Nausea, vomiting, abdominal pain, diarrhea,* GI bleeding
GU: Hematuria, abnormal kidney function, UTI
HEMA: Hemorrhage
MISC: *Back pain, headache,* infection
RESP: Pneumonia, dyspnea, coughing, hemoptysis
SYST: Sepsis

PHARMACOKINETICS

Metabolized in liver by P450 CYP3A 4/5, distributed to extracellular fluid, 54% plasma protein binding, half-life 39-51 min, excreted in feces, steady state 1-3 hr

INTERACTIONS

Increase: bleeding risk—antiplatelets, NSAIDs, salicylates, dipyridamole, clopidogrel, ticlopidine, heparin, warfarin, glycoprotein IIb/IIIa antagonists (abciximab, tirofiban, eptifibatide), thrombolytics (alteplase, reteplase, urokinase, tenecteplase), other anticoagulants

NURSING CONSIDERATIONS

Assess:
• Baseline aPTT before treatment; do not start treatment if aPTT ratio is ≥2.5, then check aPTT 2 hr after initiation of treatment and at least daily thereafter
• aPTT, which should be 1.5-3 × control, draw blood for ACT every 20-30 min during long PCI
⚠ **Bleeding** gums: petechiae; ecchymosis; black, tarry stools; hematuria/epistaxis; B/P; vaginal bleeding, possible hemorrhage
⚠ **Anaphylaxis:** dyspnea, rash during treatment
• Fever, skin rash, urticaria
Evaluate:
• Therapeutic response: absence or decrease of thrombosis
Teach patient/family:
• To use a soft-bristle toothbrush to avoid bleeding gums; avoid contact sports; use electric razor; avoid IM inj

• To report any signs of bleeding: gums, under skin, urine, stools; trouble breathing wheezing, skin rash
• To notify prescriber if planning to become pregnant, breastfeeding

ARIPiprazole (Rx)

(a-rip-ip-pra'zol)
Abilify, Abilify Discmelt
Func. class.: Antipsychotic
Chem. class.: Quinolinone

ACTION: Exact mechanism unknown; may be mediated through both DOPamine type 2 (D_2, D_3) and serotonin type 2 ($5\text{-}HT_{1A}$, $5\text{-}HT_{2A}$) antagonism

USES: Schizophrenia and bipolar disorder (adults and adolescents), agitation, mania, major depressive disorder, short-term mania or mixed episodes of bipolar disorder; irritability in patients with autism
Unlabeled uses: Psychosis in patients with dementia

CONTRAINDICATIONS: Breastfeeding, hypersensitivity, seizure disorders
Precautions: Pregnancy (C), geriatric patients, renal/hepatic/cardiac disease
Black Box Warning: Children, dementia, suicidal ideation

DOSAGE AND ROUTES

Major depressive disorder
• **Adult: PO** 2-5 mg/day as an adjunct to other antidepressant treatment; adjust by 5 mg at ≥1 wk (range, 2-15 mg/day)
Schizophrenia
• **Adult: PO** 10-15 mg/day; if needed, dosage may be increased to 30 mg/day after 2 wk; maintenance 15 mg/day; periodically reassess
• **Adolescent 13-17 yr: PO** 2 mg/day, may increase to 5 mg after 2 days, then 10 mg after 2 more days, max 30 mg/day
Bipolar disorder
• **Adult: PO** 15 mg/day, may increase to 30 mg if needed (monotherapy); adjunctive to lithium or valproate PO 10-15 mg qd, may increase to 30 mg if needed
• **Child >10 yr, adolescents: PO** 2 mg, titrate to 5 mg/day after 2 days to target of 10 mg/day after another 2 days
Agitation with bipolar disorder/ schizophrenia
• **Adult: IM** 9.75 mg as a single dose, may start with a lower dose, max 30 mg/day
Irritability associated with autism
• **Child ≥6 yr, adolescents: PO** 2 mg/day, increase to 5 mg/day after 1 wk, may increase to 10-15 mg/day if needed; dose changes should not occur more frequently than q1wk
Potential CYP2D6 inhibitor, strong CYP3A4 inhibitors
• **Adult: PO** Reduce to 50% of usual dose, increase dose when CYP2D6, CYP3A4 inhibitor withdrawn
Combination of strong CYP3A4/ CYP2D6 inhibitors
• **Adult: PO** reduce to 25% of usual dose
Acute psychosis (unlabeled)
• **Adults: PO** 15 mg/day, may increase to 20-30 mg/day after 3 wk
Available forms: Tabs 2, 5, 10, 15, 20, 30 mg; inj 9.75 mg/1.3 ml; orally disintegrating tab 10, 15 mg; oral sol 1 mg/ml
Administer:
PO route
• May be given without regard to meals
• Orally disintegrating tabs; do not open blister until ready to use, do not push tab through foil; place on tongue, allow to dissolve, swallow, do not divide
• Oral liquid: use calibrated measuring device
• Oral solution: can be substituted for tablet on a mg-per-mg, up to 25 mg dose. Patients receiving 30-mg tablets should receive 25 mg of solution
IM route
• Give IM only; inject slowly, deeply into muscle mass; discard unused portion

SIDE EFFECTS

CNS: *Drowsiness, insomnia, agitation, anxiety, headache,* seizures, neuroleptic

malignant syndrome, *light-headedness, akathisia, asthenia, tremor,* stroke, suicidal ideation, dystonia
CV: Orthostatic hypotension, tachycardia
EENT: *Blurred vision, rhinitis*
GI: *Constipation, nausea, vomiting,* jaundice, *weight gain*
INTEG: *Rash*
META: Hyperglycemia, dyslipidemia
RESP: *Cough*
SYST: Death among geriatric patients with dementia

PHARMACOKINETICS

PO: Absorption 87%; extensively metabolized by liver to a major active metabolite; plasma protein binding >99%; terminal half-life 75-146 hr; excretion via urine 25%, feces 55%; clearance decreased in geriatric patients

INTERACTIONS

Increase: effects of ARIPiprazole—CYP3A4 inhibitors (ketoconazole, erythromycin), CYP2D6 inhibitors (quiNIDine, FLUoxetine, PARoxetine); reduce dose of ARIPiprazole
Increase: sedation—other CNS depressants, alcohol
Increase: EPS—other antipsychotics, lithium
Decrease: ARIPiprazole level—famotidine, valproate
Decrease: effects of ARIPiprazole—CYP3A4 inducers (carBAMazepine)
Drug/Herb
Decrease: ARIPiprazole effect—St. John's wort

NURSING CONSIDERATIONS

Assess:

Black Box Warning: **Mental status** before initial administration, children/young adults may exhibit suicidal thoughts/behaviors, therefore smallest amount of product should be given; elderly patients with dementia-related psychosis are at increased risk of death

- Swallowing of PO medication; check for hoarding, giving of medication to other patients
- I&O ratio; palpate bladder if urinary output is low
- Bilirubin, CBC, LFTs, weight, lipid profile, fasting blood glucose q mo
- Affect, orientation, LOC, reflexes, gait, coordination, sleep pattern disturbances
- B/P standing and lying; also pulse, respirations; take q4hr during initial treatment; establish baseline before starting treatment; report drops of 30 mm Hg; watch for ECG changes
- Dizziness, faintness, palpitations, tachycardia on rising
- **EPS,** including akathisia (inability to sit still, no pattern to movements), tardive dyskinesia (bizarre movements of the jaw, mouth, tongue, extremities), pseudoparkinsonism (rigidity, tremors, pill rolling, shuffling gait)

⚠ **Neuroleptic malignant syndrome:** hyperthermia, increased CPK, altered mental status, muscle rigidity; notify prescriber immediately

- Constipation, urinary retention daily; if these occur, increase bulk, water in diet; stool softeners, laxatives may be needed

Perform/provide:

- Supervised ambulation until patient is stabilized on medication; do not involve patient in strenuous exercise program because fainting is possible; patient should not stand still for a long time
- Storage in tight, light-resistant container

Evaluate:

- Therapeutic response: decrease in emotional excitement, hallucinations, delusions, paranoia; reorganization of patterns of thought, speech

Teach patient/family:

- That orthostatic hypotension may occur; to rise from sitting or lying position gradually
- To avoid hot tubs, hot showers, tub baths; hypotension may occur
- To avoid abrupt withdrawal of this product; EPS may result; product should be withdrawn slowly

- To avoid OTC preparations (cough, hay fever, cold) unless approved by prescriber because serious product interactions may occur; to avoid use with alcohol, CNS depressants because increased drowsiness may occur
- To avoid hazardous activities if drowsy, dizzy
- About compliance with product regimen
- To report impaired vision, tremors, muscle twitching, urinary retention
- That heat stroke may occur in hot weather; to take extra precautions to stay cool
- To notify prescriber if pregnant or intending to become pregnant; not to breastfeed

Black Box Warning: To report suicidal thoughts/behaviors immediately

TREATMENT OF OVERDOSE:
Lavage if orally ingested; provide airway; *do not induce vomiting*

RARELY USED

armodafinil (Rx)
(ar-moe-daf'in-il)
Nuvigil

Controlled Substance Schedule IV

USES: Narcolepsy, obstructive sleep apnea/hypoapnea syndrome, circadian rhythm disruption (shift-work sleep problems)

CONTRAINDICATIONS: Hypersensitivity to this product or modafinil

DOSAGE AND ROUTES

Narcolepsy, obstructive sleep apnea/hypoapnea syndrome
- **Adult and adolescent ≥17 yr: PO** 150-250 mg in AM

Circadian rhythm disruption (shift work sleep problems)
- **Adult and adolescent ≥17 yr: PO** 150 mg at start of shift

ascorbic acid (vit C) (OTC, Rx)
(a-skor'bic)
Acerola C, Apo-C ♣, Ascor L-500, Cenolate, Equaline Vitamin C, Walgreens Gold Seal, and many more
Func. class.: Vit C—water-soluble vitamin

ACTION: Wound healing, collagen synthesis, antioxidant, carbohydrate metabolism

USES: Vit C deficiency, scurvy; delayed wound, bone healing; chronic disease; urine acidification; before gastrectomy; dietary supplement
Unlabeled uses: Common cold prevention

CONTRAINDICATIONS: Tartrazine, sulfite sensitivity; G6PD deficiency
Precautions: Pregnancy (C), gout, diabetes, renal calculi (large doses)

DOSAGE AND ROUTES

Dietary supplementation
- **Adult:** 50-500 mg/day
- **Child 14-18 yr: PO** 65 mg (female), 75 mg (male)
- **Child 9-13 yr: PO** 45 mg/day
- **Child 4-8 yr: PO** 25 mg/day
- **Child 1-3 yr: PO** 15 mg/day
- **Infant: PO** 40-50 mg/day

Scurvy
- **Adult: PO/SUBCUT/IM/IV** 100-250 mg/day × 2 wk then 50 mg or more daily
- **Child: PO/SUBCUT/IM/IV** 100-300 mg/day × 2 wk then 35 mg or more daily

Wound healing/chronic disease/fracture (may be given with zinc)
- **Adult: SUBCUT/IM/IV/PO** 200-500 mg/day for 1-2 mo
- **Child: SUBCUT/IM/IV/PO** 100-200 mg added doses for 1-2 mo

Urine acidification
- **Adult:** 4-12 g/day in divided doses
- **Child:** 500 mg q6-8hr

Available forms: Tabs 25, 50, 100, 250, 500, 1000, 1500 mg; effervescent tabs 1000 mg; chewable tabs 100, 250, 500 mg; timed-release tabs 500, 750, 1000, 1500 mg; timed-release caps 500 mg; crys 4 g/tsp; powder 4 g/tsp; liq 35 mg/0.6 ml; sol 100 mg/ml; syr 20 mg/ml, 500 mg/5 ml; inj SUBCUT, IM, IV 100, 250, 500 mg/ml

Administer:

PO route
- Do not crush or chew ext rel tab or caps
- Caps may be opened and contents mixed with jelly

IV, direct route
- 100 mg undiluted by direct IV over at least 1 min; rapid inf may cause fainting

Intermittent IV INF route
- Diluted with D_5W, D_5NaCl, NS, LR, Ringer's, sodium lactate and given over 15 min

Syringe compatibilities: Metoclopramide, aminophylline, theophylline
Y-site compatibilities: Warfarin

SIDE EFFECTS

CNS: Headache, insomnia, dizziness, fatigue, flushing
GI: Nausea, vomiting, diarrhea, anorexia, heartburn, cramps
GU: Polyuria, urine acidification, oxalate/urate renal stones, dysuria
HEMA: Hemolytic anemia in patients with G6PD
INTEG: Inflammation at inj site

PHARMACOKINETICS

PO/INJ: Readily absorbed PO, metabolized in liver; unused amounts excreted in urine (unchanged), metabolites; crosses placenta, breast milk

INTERACTIONS

Drug/Lab Test
False positive: negatives in glucose tests
False negative: occult blood, urine bilirubin, leukocyte determination

NURSING CONSIDERATIONS

Assess:
- I&O ratio; urine pH (acidification)
- Ascorbic acid levels throughout treatment if continued deficiency is suspected
- Nutritional status: citrus fruits, vegetables
- Inj sites for inflammation
- Thrombophlebitis if receiving large dose

Evaluate:
- Therapeutic response: absence of anorexia, irritability, pallor, joint pain, hyperkeratosis, petechiae, poor wound healing

Teach patient/family:
- Necessary foods to include in diet, such as citrus fruits
- That smoking decreases vit C levels; not to exceed prescribed dose; that excesses will be excreted in urine, except when taking timed-release forms

asenapine (Rx)

(a-sen'a-peen)

Saphris

Func. class.: Antipsychotic, atypical
Chem. class.: Dibenzapine

ACTION: Unknown; may be mediated through both DOPamine type 2 (D2) and serotonin type 2 (5-HT2A) antagonism

USES: Bipolar 1 disorder, schizophrenia

CONTRAINDICATIONS: Breastfeeding, hypersensitivity
Precautions: Pregnancy (C), children, geriatric patients, cardiac/renal/hepatic disease, breast cancer, Parkinson's disease, dementia, seizure disorder, CNS

depression, agranulocytosis, QT prolongation, torsades de pointes, suicidal ideation, substance abuse

Black Box Warning: Increased mortality in elderly patients with dementia-related psychosis

DOSAGE AND ROUTES

Schizophrenia

- **Adult: SL** 5 mg bid, max 20 mg/day

Bipolar 1 disorder

- **Adult: SL** 10 mg bid, may decrease to 5 mg bid as needed, max 20 mg/day

Available forms: SL tab 5, 10 mg

Administer:

- Anticholinergic agent to be used for EPS
- **SL tab:** remove tab; place tab under tongue; after it dissolves, swallow; advise patient not to chew, crush, swallow tabs, not to eat, drink for 10 min

SIDE EFFECTS

CNS: *EPS, pseudoparkinsonism, akathisia, dystonia, tardive dyskinesia; drowsiness, insomnia, agitation, anxiety, headache,* seizures, neuroleptic malignant syndrome, dizziness

CV: Orthostatic hypotension, sinus tachycardia; heart failure, QT prolongation, stroke, bundle branch block

GI: *Nausea,* vomiting, *constipation,* weight gain, increased appetite; oral hypoesthesia/parasthesia, mucosal ulcers, increased salivation (SL)

GU: Hyperprolactinemia, hyperglycemia, hyponatremia

HEMA: Thrombocytopenia

INTEG: Serious allergic reactions

PHARMACOKINETICS

Extensively metabolized by liver, protein binding 95%, peak 0.5-1.5 hr, terminal half-life 24 hr

INTERACTIONS

Increase: sedation—other CNS depressants, alcohol

Increase: EPS—CYP2D6 inhibitors/substrates (SSRIs)

Increase: EPS—other antipsychotics

Increase: asenapine excretion—carBAMazepine

Increase: QT prolongation—class IA/III antidysrhythmics, some phenothiazines, β-agonists, local anesthetics, tricyclics, haloperidol, methadone, chloroquine, clarithromycin, droperidol, erythromycin, pentamidine

Decrease: asenapine action—CYP2D6 inducers (carBAMazepine, barbiturates, phenytoins, rifampin)

Drug/Herb

Increase: CNS depression—kava

Increase: EPS—betel palm, kava

Drug/Lab Test

Increase: prolactin levels, glucose LFTs

NURSING CONSIDERATIONS

Assess:

⚠ Mental status before initial administration; watch for suicidal thoughts and behaviors; dementia and death may occur among elderly patients

- Affect, orientation, LOC, reflexes, gait, coordination, sleep pattern disturbances
- B/P standing and lying; also pulse, respirations; take these q4hr during initial treatment; establish baseline before starting treatment; report drops of 30 mm Hg; watch for ECG changes; QT prolongation may occur
- Dizziness, faintness, palpitations, tachycardia on rising
- **EPS,** including akathisia, tardive dyskinesia (bizarre movements of the jaw, mouth, tongue, extremities), pseudoparkinsonism (rigidity, tremors, pill rolling, shuffling gait)
- **Neuroleptic malignant syndrome:** hyperthermia, increased CPK, altered mental status, muscle rigidity
- Constipation daily; increase bulk, water in diet if needed
- Weight gain, hyperglycemia, metabolic changes with diabetes

Perform/provide:
• Supervised ambulation until patient stabilized on medication; do not involve patient in strenuous exercise program because fainting is possible; patient should not stand still for a long time
• Storage in tight, light-resistant container

Evaluate:
• Therapeutic response: decrease in emotional excitement, hallucinations, delusions, paranoia; reorganization of patterns of thought, speech

Teach patient/family:
• That orthostatic hypotension may occur; to rise from sitting or lying position gradually
• To avoid hot tubs, hot showers, tub baths; hypotension may occur
• To avoid abrupt withdrawal of this product; EPS may result; product should be withdrawn slowly
• To avoid OTC preparations (cough, hay fever, cold) unless approved by prescriber; serious product interactions may occur; to avoid use of alcohol; increased drowsiness may occur
• To avoid hazardous activities if drowsy, dizzy
• About compliance with product regimen
• That heat stroke may occur in hot weather; to take extra precautions to stay cool
• To use contraception; to inform prescriber if pregnancy is planned, suspected

Black Box Warning: To report suicidal thoughts/behaviors immediately

TREATMENT OF OVERDOSE:
Lavage if orally ingested; provide airway; *do not induce vomiting*

RARELY USED
⚠ HIGH ALERT

A

asparaginase (Rx)
(a-spare'a-gi-nase)
Elspar
Func. class.: Antineoplastic
Chem. class.: Escherichia coli enzyme

USES: Acute lymphocytic leukemia in combination with other antineoplastics

CONTRAINDICATIONS: Hypersensitivity to product or *E. coli* protein, thromboembolic disease, infants, breastfeeding, pancreatitis

DOSAGE AND ROUTES

In combination
• **Adult and child: IM/IV** 25,000 international units/m^2/wk × 2 wk or 6000 international units/m^2 every other day × 3-4 wk or 1000-20,000 international units/m^2 for 10-12 days

asparaginase *Erwinia chrysanthemi*
Erwinaze
Func. class.: Antineoplastic, natural and semisynthetic

ACTION: Contains an asparaginase specific enzyme L-asparaginase derived from Erwinia chrysanthemi, which catalyzes of asparagine to aspartic acid and ammonia and causes reduced circulating concentrations of asparagine; efficacy of asparaginase *Erwinia chrysanthemi* may be leukemic cell cytotoxicity from asparagine deficiency

USES: Treatment of acute lymphocytic leukemia (ALL) in combination with other chemotherapeutic agents in patients who have developed hypersensitivity to *E. coli*–derived asparaginase

CONTRAINDICATIONS:

Hypersensitivity, breastfeeding, history of serious pancreatitis, bleeding, or serious thrombosis with prior L-asparaginase therapy

Precautions: Pregnancy (C), children <2 yr, hepatic disease, diabetes mellitus

DOSAGE AND ROUTES

- **Adult, adolescent, child ≥2 yr (substitute for pegaspargase): IM** 25,000 IU/m² 3 ×/wk (Monday/Wednesday/Friday) × 6 doses for each planned dose of pegaspargase within a treatment
- **Adult (substitute for L-asparaginase *E. coli*): IM** 25,000 IU/m² for each scheduled dose of native *E. coli* asparaginase within a treatment

Available forms: Powder for inj 10,000 Units

Administer:

- Slowly inject 1 or 2 ml of preservative-free sterile sodium chloride (0.9%) inj against inner vial wall; do not forcefully inject sol directly onto or into powder; if 1 ml of NS is used, conc is 10,000 IU/ml; if 2 ml of NS is used, conc is 5000 IU/ml; dissolve contents by gentle mixing or swirling; do not shake or invert vial
- Reconstituted sol should be clear and colorless; discard if any visible particles or protein aggregates are present
- Calculate the volume needed to obtain dose; withdraw volume containing calculated dose from vial into polypropylene syringe within 15 min of reconstitution

IM route

Administer dose by IM inj within 4 hr of reconstitution; limit volume to 2 ml per inj site; multiple inj sites may be needed

SIDE EFFECTS

ENDO: Hyperglycemia
GI: Pancreatitis
HEMA: Bleeding, serious thrombosis
INTEG: Local inj site reaction
MISC: Hyperammonemia (seizure, headache), neurotoxicity, elevated hepatic enzymes, hyperbilirubinemia
SYST: Anaphylaxis

PHARMACOKINETICS

Achieved serum trough asparaginase activity concentrations ≥0.1 IU/ml by 72 hr after dose 3

INTERACTIONS

Synergistic or antagonistic action of: methotrexate
Increase: neurotoxicity—vinCRIStine
Increase: pancreatitis risk—cytarabine
Increase: hyperglycemia—corticosteroids
Increase: bleeding risk—NSAIDs, thrombolytics, salicylates, anticoagulants, platelet inhibitors

Drug/Lab Test

Increase: liver function tests, ammonia
Decrease: fibrinogen, protein C activity, protein S activity, anti-thrombin III

NURSING CONSIDERATIONS

Assess:

- **Anaphylaxis:** give only with resuscitation equipment and other agents necessary to treat anaphylaxis; if a serious hypersensitivity reaction occurs, discontinue product
- **Bleeding:** identify if NSAIDs, salicylates, thrombolytics, platelet inhibitors, anticoagulants have been used; grade 1 or 2 bleeding or coagulation abnormalities may occur (serious thrombosis, sagittal sinus thrombosis); discontinue for a thrombotic or hemorrhagic event until symptoms resolve; after resolution, treatment may be resumed; coagulation proteins were decreased in most patients after a 2-wk course: fibrinogen, protein C activity, protein S activity, antithrombin III

⚠ **Pancreatitis:** discontinue for severe or hemorrhagic pancreatitis (abdominal pain >72 hr and amylase elevation ≥2 × upper limit of normal); mild pancreatitis, hold until the signs, symptoms subside and amylase concentrations return to normal, then resume

- **Hyperglycemia:** glucose intolerance that is irreversible in some cases; monitor baseline and periodic glucose concentration; administer insulin therapy as needed

⚠ Hyperammonemia/neurotoxicity: seizures, headache; asparagine rescue may be used to treat acute CNS toxicity; doses of asparagine used were 1-2 mmol/kg/day continuous IV inf × 5 days
Monitor liver function tests and for hyperbilirubinemia
Local injection site reaction: no more than 2 ml of the reconstituted product is to be administered at a single injection site
Perform/provide:
• Do not freeze or refrigerate the reconstituted solution; discard any unused portions
Evaluate:
• Decreased spread of malignancy
Teach patient/family:
⚠ To get immediate medical advice if they experience abdominal pain, nausea, vomiting, diarrhea; pancreatitis may occur
⚠ To get immediate medical advice if experiencing anaphylactic reactions
• To contact provider if patient experiences excessive thirst or any increase in volume or frequency of urination; hyperglycemia may occur

aspirin (OTC)

(as'pir-in)
APC-ASA Coated Aspirin ✤, A.S.A., Ascriptin Enteric, Aspergum, Aspirin ✤, Aspir-Low, Aspir-trin ✤, Bayer Aspirin, Bayer Children's Aspirin, Bufferin, Ecotrin, Equaline, Good Sense Aspirin, Halfprin, PMS-ASA ✤, St. Joseph Children's, St. Joseph's Adult, Walgreens Aspirin Adult
Func. class.: Nonopioid analgesic, nonsteroidal antiinflammatory, antipyretic, antiplatelet
Chem. class.: Salicylate

Do not confuse:
Ascendin/Afrin

ACTION: Blocks pain impulses in CNS, reduces inflammation by inhibition of prostaglandin synthesis; antipyretic action results from vasodilation of peripheral vessels; decreases platelet aggregation

USES: Mild to moderate pain or fever including RA, osteoarthritis, thromboembolic disorders; TIAs, rheumatic fever, post-MI, prophylaxis of MI, ischemic stroke, angina, acute MI
Unlabeled uses: Prevention of cataracts (long-term use), prevention of pregnancy loss in women with clotting disorders, bone pain, claudication, colorectal cancer prophylaxis, Kawasaki disease, PCI, preeclampsia/thrombosis prophylaxis, vernal keratoconjunctivitis, pericarditis

CONTRAINDICATIONS: Pregnancy (D) 3rd trimester, breastfeeding, children <12 yr, children with flulike symptoms, hypersensitivity to salicylates, tartrazine (FDC yellow dye #5), GI bleeding, bleeding disorders, vit K deficiency, peptic ulcer, acute bronchospasm, agranulocytosis, increased intracranial pressure, intracranial bleeding, nasal polyps, urticaria
Precautions: Abrupt discontinuation, acetaminophen/NSAIDs hypersensitivity, acid/base imbalance, alcoholism, ascites, asthma, bone marrow suppression in elderly patients, dehydration, G6PD deficiency, gout, heart failure, anemia, renal/hepatic disease, pre/postoperatively, gastritis, pregnancy (C) 1st trimester

DOSAGE AND ROUTES

Arthritis
• **Adult: PO** 3 g/day in divided doses q4-6hr
• **Child >25 kg (55 lb): PO/RECT** 90-130 mg/kg/day in divided doses
Pain/fever
• **Adult: PO/RECT** 325-650 mg q4hr prn, max 4 g/day
• **Child 2-11 yr: PO** 10-15 mg/kg/dose q4hr, max 4 g/day

Thromboembolic disorders
• **Adult: PO** 325-650 mg/day or bid
Transient ischemic attacks (risk)
• **Adult: PO** 50-325 mg/day (grade 1A)
Evolving MI with ST segment elevation (STEMI)
• **Adult: PO** 160-325 mg nonenteric, chewed and swallowed immediately, maintenance 75-162 mg daily
MI, stroke prophylaxis
• **Adult: PO** 50-325 mg/day
Prevention of recurrent MI
• **Adult: PO** 75-162 mg/day
CABG
• **Adult: PO** 75-325 mg/day starting 6 hr postprocedure, continue for 1 yr
PTCA
• **Adult: PO** 325 mg 2 hr before surgery
Thrombosis prophylaxis in ACS (unlabeled)
• **Adult: PO** 160-325 mg nonenteric, chewed and swallowed immediately
Idiopathic/viral pericarditis (unlabeled)
• **Adult: PO** 800 mg tid-qid × 7-10 days with gradual tapering to 800 mg/day q wk for an additional 2-3 wk
Colorectal cancer prophylaxis (unlabeled)
• **Adult: PO** 325 mg every other day
Kawasaki disease (unlabeled)
• **Child: PO** 80-100 mg/kg/day in 4 divided doses, maintenance 3-5 mg/kg/day
Available forms: Tabs 81, 325, 500, 650, 800 mg; chewable tabs 81 mg; supp 300, 600 mg; gum 227 mg; enteric-coated tabs 81, 325, 500, 975 mg; ext rel tabs 800 mg; del rel tabs 325, 500 mg; suppository 300, 600 mg
Administer:
PO route
• Do not break, crush, or chew enteric product
• Crushed or whole; chewable tablets may be chewed
• ½ hr before planned exercise
• With food or milk to decrease gastric symptoms; separate by 2 hr from enteric products
• With 8 oz of water; sit upright for ½ hr after dose to facilitate product passing into stomach
Rectal route
• Place suppository in refrigerator for at least 30 minutes before removing wrapper

SIDE EFFECTS

CNS: Stimulation, drowsiness, dizziness, confusion, seizures, headache, flushing, hallucinations, coma
CV: Rapid pulse, pulmonary edema
EENT: Tinnitus, hearing loss
ENDO: Hypoglycemia, hyponatremia, hypokalemia
GI: *Nausea, vomiting,* GI bleeding, diarrhea, heartburn, anorexia, hepatitis, GI ulcer
HEMA: Thrombocytopenia, agranulocytosis, leukopenia, neutropenia, hemolytic anemia, increased PT, aPTT, bleeding time
INTEG: *Rash,* urticaria, bruising
RESP: Wheezing, hyperpnea, bronchospasm
SYST: Reye's syndrome (children), anaphylaxis, laryngeal edema

PHARMACOKINETICS

Enteric metabolized by liver; inactive metabolites excreted by kidneys; crosses placenta; excreted in breast milk; half-life 15-20 min, up to 9 hr in large dose; rectal products may be erratic, protein binding 90%
PO: Onset 15-30 min, peak 1-2 hr, duration 4-6 hr, well absorbed
RECT: Onset slow, duration 4-6 hr

INTERACTIONS

Increase: gastric ulcer risk—corticosteroids, antiinflammatories, NSAIDs, alcohol
Increase: bleeding—alcohol, plicamycin, cefamandole, thrombolytics, ticlopidine, clopidogrel, tirofiban, eptifibatide, anticoagulants
Increase: effects of warfarin, insulin, methotrexate, thrombolytic agents, peni-

cillins, phenytoin, valproic acid, oral hypoglycemics, sulfonamides
Increase: salicylate levels—urinary acidifiers, ammonium chloride, nizatidine
Increase: hypotension—nitroglycerin
Decrease: effects of aspirin—antacids (high doses), urinary alkalizers, corticosteroids
Decrease: antihypertensive effect—ACE inhibitors
Decrease: effects of probenecid, spironolactone, sulfinpyrazone, sulfonylamides, NSAIDs, β-blockers, loop diuretics

Drug/Herb
Increase: risk of bleeding—feverfew, garlic, ginger, ginkgo, ginseng *(Panax)*, horse chestnut

Drug/Food
Increase: risk of bleeding—fish oil (omega-3 fatty acids)
• Foods that acidify urine may increase aspirin level

Drug/Lab Test
Increase: coagulation studies, LFTs, serum uric acid, amylase, CO_2, urinary protein
Decrease: serum potassium, cholesterol
Interference: VMA, 5-HIAA, xylose tolerance test, TSH, pregnancy test

NURSING CONSIDERATIONS

Assess:
• **Pain:** character, location, intensity; ROM before and 1 hr after administration
• **Fever:** temp before and 1 hr after administration
• Hepatic studies: AST, ALT, bilirubin, creatinine if patient is receiving long-term therapy
• Renal studies: BUN, urine creatinine; I&O ratio; decreasing output may indicate renal failure (long-term therapy)
• Blood studies: CBC, Hct, Hgb, PT if patient is receiving long-term therapy
Hepatotoxicity: dark urine, clay-colored stools, yellowing of skin, sclera, itching, abdominal pain, fever, diarrhea if patient is receiving long-term therapy
• **Allergic reactions:** rash, urticaria; if these occur, product may have to be discontinued; patients with asthma, nasal polyps, allergies: severe allergic reaction may occur
• **Ototoxicity:** tinnitus, ringing, roaring in ears; audiometric testing needed before, after long-term therapy
• **Salicylate level:** therapeutic level 150-300 mcg/ml for chronic inflammation
• Edema in feet, ankles, legs
• Product history; many product interactions

Evaluate:
• Therapeutic response: decreased pain, inflammation, fever

Teach patient/family:
• To report any symptoms of hepatotoxicity, renal toxicity, visual changes, ototoxicity, allergic reactions, bleeding (long-term therapy)
• To avoid if allergic to tartrazine
• Not to exceed recommended dosage; acute poisoning may result
• To read labels on other OTC products because many contain aspirin, salicylates
• That the therapeutic response takes 2 wk (arthritis)
• To report tinnitus, confusion, diarrhea, sweating, hyperventilation
• To avoid alcohol ingestion; GI bleeding may occur
• That patients who have allergies, nasal polyps, asthma may develop allergic reactions
• To discard tabs if vinegar-like smell is detected
• That medication is not to be given to children or teens with flulike symptoms or chickenpox because Reye's syndrome may develop
• To take with a full glass of water
• Not to use during 3rd trimester of pregnancy (D)

TREATMENT OF OVERDOSE:

Lavage, activated charcoal, monitor electrolytes, VS

atazanavir (Rx)

(at-a-za-na'veer)

Reyataz

Func. class.: Antiretroviral

Chem. class.: Protease inhibitor

ACTION: Inhibits human immunodeficiency virus (HIV-1) protease, which prevents maturation of the infectious virus

USES: HIV-1 infection in combination with other antiretroviral agents

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, hepatic disease, alcoholism, drug resistance, AV block, diabetes, dialysis, elderly, females, hemophilia, hypercholesterolemia, immune reconstitution syndrome, lactic acidosis, pancreatitis

DOSAGE AND ROUTES

Antiretroviral-naive patients

- **Adult: PO** 400 mg/day (unable to take ritonavir); 300 mg with ritonavir 100 mg/day
- **Child ≥6 yr/adolescent ≥40 kg: PO** 300 mg with ritonavir 100 mg daily
- **Child ≥6 yr/adolescent 20 to <40 kg: PO** 200 mg with ritonavir 100 mg daily
- **Child ≥6 yr/adolescent 15 to <20 kg: PO** 150 mg with ritonavir 80 mg daily

Antiretroviral-experienced patients

- **Adult: PO** 300 mg with ritonavir 100 mg daily
- **Pregnant adults/adolescents (2nd/3rd trimester) with H2 blocker or tenofovir: PO** 400 mg with ritonavir 100 mg daily
- **Child ≥6 yr/adolescent ≥40 kg: PO** 300 mg with ritonavir 100 mg daily
- **Child ≥6 yr/adolescent 20 to <40 kg: PO** 200 mg with ritonavir 100 mg daily

Hepatic dose

- **Adult: PO** Child-Pugh B: 300 mg/day; Child-Pugh C: do not use

Available forms: Caps 100, 150, 200, 300 mg

Administer:

- With food; 2 hr before or 1 hr after antacid or didanosine, swallow cap whole

SIDE EFFECTS

CNS: Headache, depression, dizziness, insomnia, peripheral neurologic symptoms

GI: Vomiting, *diarrhea, abdominal pain, nausea,* hepatotoxicity

INTEG: *Rash,* Stevens-Johnson syndrome, *photosensitivity*

MISC: Fatigue, fever, arthralgia, back pain, cough, lipodystrophy, pain, gynecomastia, nephrolithiasis; lactic acidosis, hyperbilirubinemia (pregnancy, females, obesity)

PHARMACOKINETICS

Rapidly absorbed, absorption increased with food, peak 2½ hr, 86% protein bound, extensively metabolized in liver by CYP3A4, 27% excreted unchanged in urine/feces (minimal), half-life 7 hr

INTERACTIONS

Increase: levels, toxicity of immunosuppressants (cycloSPORINE, sirolimus, tacrolimus, sildenafil), tricylic antidepressants, warfarin, calcium channel blockers, clarithromycin, chlorazepate, diazepam, irinotecan, HMG-CoA reductase inhibitors, antidysrhythmics, midazolam, triazolam, ergots, pimozide, other protease inhibitors

Increase: effects of estrogens, oral contraceptives

Increase: atazanavir levels—CYP3A4 substrates, CYP3A4 inhibitors

Increase: hyperbilirubinemia—indinavir

Decrease: teleprevir level when used with atazanavir and ritonavir

Decrease: atazanavir levels—CYP3A4 inducers, rifampin, antacids, didanosine, efavirenz, proton-pump inhibitors, H_2-receptor antagonists

Drug/Herb
Decrease: atazanavir levels—St. John's wort, avoid concurrent use
Increase: myopathy, rhabdomyolysis—red yeast rice
Drug/Lab Test
Increase: AST, ALT, total bilirubin, amylase, lipase, CK
Decrease: Hgb, neurophils, platelets

NURSING CONSIDERATIONS

Assess:
⚠ For hepatic failure; hepatic studies: ALT, AST, bilirubin
• Immune reconstitution syndrome: When given with combination antiretroviral therapy
• For lactic acidosis, hyperbilirubinemia (females, pregnancy, obesity), if pregnant call Antiretroviral Pregnancy Registry 800-258-4263
• For signs of infection, anemia, nephrolithiasis
• Bowel pattern before, during treatment; if severe abdominal pain with bleeding occurs, product should be discontinued; monitor hydration
• Viral load, CD4 count throughout treatment
• Skin eruptions, rash, urticaria, itching
Evaluate:
• Therapeutic response: increasing CD4 counts; decreased viral load, resolution of symptoms of HIV-1 infection
Teach patient/family:
• To take as prescribed with other antiretrovirals as prescribed; if dose is missed, to take as soon as remembered up to 1 hr before next dose; not to double dose, share with others
• That product must be taken daily to maintain blood levels for duration of therapy
• That product may cause photosensitivity; to use protective clothing, stay out of the sun
• To notify prescriber if diarrhea, nausea, vomiting, rash occurs; dizziness, lightheadedness may occur; ECG may be altered
• That product interacts with many products; St. John's wort; to advise prescriber of all products, herbal products used
• That redistribution of body fat may occur, the effect is not known
• That product does not cure HIV-1 infection, prevent transmission to others; only controls symptoms
• That, if taking phosphodiesterase type 5 inhibitor with atazanavir, there may be increased risk of phosphodiesterase type 5 inhibitor–associated adverse events (hypotension, prolonged penile erection); to notify physician promptly of these symptoms

A

atenolol (Rx)

(a-ten'oh-lole)
Tenormin
Func. class.: Antihypertensive, antianginal
Chem. class.: β-Blocker, β_1-, β_2-blocker (high doses)

Do not confuse:
atenolol/albuterol
Tenormin/thiamine/Imuran

ACTION: Competitively blocks stimulation of β-adrenergic receptor within vascular smooth muscle; produces negative chronotropic activity (decreases rate of SA node discharge, increases recovery time), slows conduction of AV node, decreases heart rate, negative inotropic activity decreases O_2 consumption in myocardium; decreases action of renin-aldosterone-angiotensin system at high doses, inhibits β_2 receptors in bronchial system at higher doses

USES: Mild to moderate hypertension, prophylaxis of angina pectoris; suspected or known MI (IV use); MI prophylaxis
Unlabeled uses: Migraine prophylaxis, supraventricular tachycardia prophylaxis (PSVT), unstable angina, alcohol withdrawal, lithium-induced tremor

CONTRAINDICATIONS:

Pregnancy (D), hypersensitivity to β-blockers, cardiogenic shock, 2nd- or 3rd-degree heart block, sinus bradycardia, cardiac failure, Raynaud's disease, pulmonary edema

Precautions: Breastfeeding, major surgery, diabetes mellitus, thyroid/renal disease, CHF, COPD, asthma, well-compensated heart failure, dialysis, myasthenia gravis

Black Box Warning: Abrupt discontinuation

DOSAGE AND ROUTES

• **Adult: PO** 25-50 mg/day, increasing q1-2wk to 100 mg/day; may increase to 200 mg/day for angina, up to 100 mg/day for hypertension

• **Child: PO** 0.8-1 mg/kg/dose initially; range, 0.8-1.5 mg/kg/day; max 2 mg/kg/day

• **Geriatric: PO** 25 mg/day initially

Chronic stable angina

• **Adult: PO** 50 mg/day, then 100 mg/day as needed after 7 days, max 200 mg/day

Post MI, MI prophylaxis

• **Adult: PO** 100 mg/day in 1-2 divided doses; may need for 1-3 yr after MI

Renal disease

• **Adult: PO** CCr 15-35 ml/min, max 50 mg/day; CCr <15 ml/min, max 25 mg/day; hemodialysis 25-50 mg after dialysis

PSVT prophylaxis (unlabeled)

• **Child: PO** 0.3-1.3 mg/kg/day

Ethanol withdrawal prevention (unlabeled)

• **Adult: PO** 50-100 mg/day

Migraine prophylaxis (unlabeled)

• **Adult: PO** 50-150 mg/day, titrate to response

Lithium-induced tremor (unlabeled)

• **Adult: PO** 50 mg/day

Available forms: Tabs 25, 50, 100 mg

Administer:

PO route

• Before meals, at bedtime; tab may be crushed, swallowed whole

• Reduced dosage with renal dysfunction

SIDE EFFECTS

CNS: *Insomnia, fatigue, dizziness, mental changes,* memory loss, hallucinations, depression, lethargy, drowsiness, strange dreams, catatonia

CV: Profound hypotension, bradycardia, CHF, *cold extremities, postural hypotension, 2nd- or 3rd-degree heart block*

EENT: Sore throat; dry, burning eyes; blurred vision; stuffy nose

ENDO: Increased hypoglycemic response to insulin

GI: *Nausea, diarrhea,* vomiting, mesenteric arterial thrombosis, ischemic colitis

GU: Impotence, decreased libido

HEMA: Agranulocytosis, thrombocytopenia purpura

INTEG: Rash, fever, alopecia

RESP: Bronchospasm, dyspnea, wheezing, pulmonary edema

PHARMACOKINETICS

PO: Peak 2-4 hr; onset 1 hr; duration 24 hr; half-life 6-9 hr; excreted unchanged in urine, feces (50%); protein binding 5%-15%

INTERACTIONS

• Mutual inhibition: sympathomimetics (cough, cold preparations)

Increase: hypotension, bradycardia—reserpine, hydrALAZINE, methyldopa, prazosin, anticholinergics, digoxin, diltiazem, verapamil, cardiac glycosides, antihypertensives

Increase: hypoglycemia—insulins, oral antidiabetics

Increase: hypertension—amphetamines, ePHEDrine, pseudoephedrine

Decrease: effect—insulin, oral antidiabetic agents, theophylline, DOPamine, MAOIs

Drug/Herb

Increase: atenolol effect—hawthorn

Decrease: atenolol effect—ephedra (ma huang)

Drug/Lab Test

Increase: blood glucose, BUN, potassium, triglycerides, uric acid, ANA titer

NURSING CONSIDERATIONS

Assess:

- I&O, weight daily; watch for CHF (rales/crackles, jugular vein distention, weight gain, edema)
- **Hypertension:** B/P, pulse q4hr; note rate, rhythm, quality; apical/radial pulse before administration; notify prescriber of any significant changes (<50 bpm); ECG
- **Hypotension:** may be caused in hemodialysis
- **Hypoglycemia:** may be masked in diabetes mellitus
- Baselines in renal/hepatic studies before therapy begins

Black Box Warning: Taper gradually do not discontinue abruptly

Perform/provide:

- Storage protected from light, moisture; place in cool environment

Evaluate:

- Therapeutic response: decreased B/P after 1-2 wk, increased activity tolerance, decreased anginal pain

Teach patient/family:

Black Box Warning: Not to discontinue product abruptly, taper over 2 wk (angina); to take at same time each day as directed

- Not to use OTC products unless directed by prescriber
- To report bradycardia, dizziness, confusion, depression, fever
- To take pulse at home; advise when to notify prescriber
- To limit alcohol, smoking, sodium intake
- To comply with weight control, dietary adjustments, modified exercise program
- To carry emergency ID to identify product, allergies, conditions being treated
- To avoid hazardous activities if dizziness is present
- To change position slowly
- That product may mask symptoms of hypoglycemia in diabetic patients
- To use contraception while taking this product, pregnancy category (D), avoid breastfeeding

A

TREATMENT OF OVERDOSE:

Lavage, IV atropine for bradycardia, IV theophylline for bronchospasm, dextrose for hypoglycemia, digoxin, O_2, diuretic for cardiac failure, hemodialysis

atomoxetine (Rx)

(at-o-mox'eh-teen)

Strattera

Func. class.: Psychotherapeutic—miscellaneous

Chem. class.: Selective norepinephrine reuptake inhibitor

ACTION: Selective norepinephrine reuptake inhibitor; may inhibit the presynaptic norepinephrine transporter

USES: Attention deficit hyperactivity disorder

CONTRAINDICATIONS: Hypersensitivity, angle-closure glaucoma, arteriosclerosis, cardiac disease, cardiomyopathy, heart failure, jaundice, MAOI therapy, history of pleochromocytoma

Precautions: Pregnancy (C), breastfeeding, hepatic disease, angioedema, bipolar disorder, dysrhythmias, CAD, hypo/hypertension

Black Box Warning: Children <6 yr, suicidal ideation

DOSAGE AND ROUTES

- **Child ≤70 kg >6 yrs: PO** 0.5 mg/kg/day, increase after 3 days to target daily dose of 1.2 mg/kg in AM or evenly divided doses AM, late afternoon; max 1.4 mg/kg/day or 100 mg/day, whichever is less
- **Adult and child >70 kg: PO** 40 mg/day, increase after 3 days to target daily dose of 80 mg in AM or evenly divided doses AM, late afternoon; max 100 mg/day

Maintenance

• **Adolescent ≤15 yr and child ≥6 yr: PO** 1.2-1.8 mg/kg/day

Initial dose titration with strong CYP2D6 inhibitors

• **Adult and child >6 yr weighing >70 kg: PO** 40 mg/day each AM or 2 evenly divided doses, titrate to target of 80 mg/day if symptoms do not improve after 4 wk and dose is well tolerated

Hepatic dose

• Child-Pugh B: reduce dose by 50%; Child-Pugh C: reduce dose by 75%

Available forms: Caps 10, 18, 25, 40, 60, 80, 100 mg

Administer:

• Whole; do not break, crush, chew

• Gum, hard candy, frequent sips of water for dry mouth

• Without regard to food

SIDE EFFECTS

CNS: *Insomnia,* dizziness, headache, irritability, crying, mood swings, fatigue, hypoesthesia, lethargy, paresthesia

CV: *Palpitations,* hot flushes, tachycardia, increased B/P

ENDO: Growth retardation

GI: Dyspepsia, nausea, anorexia, dry mouth, weight loss, vomiting, diarrhea, constipation, hepatic injury

GU: Urinary hesitancy, retention, dysmenorrhea, erectile disturbance, ejaculation failure, impotence, prostatitis, abnormal orgasm, male pelvic pain

INTEG: Exfoliative dermatitis, sweating, rash

MISC: Cough, rhinorrhea, dermatitis, ear infection

PHARMACOKINETICS

Peak 1-2 hr, metabolized by liver, excreted by kidneys, 98% protein binding

INTERACTIONS

Increase: hypertensive crisis—MAOIs or within 14 days of MAOIs, vasopressors

Increase: cardiovascular effects of albuterol, pressor agents

Increase: effects of atomoxetine—CYP2D6 inhibitors (amiodarone, cimetidine [weak], clomipramine, delavirdine, gefitinib, imatinib, propafenone, quiNIDine [potent], ritonavir, citalopram, escitalopram, FLUoxetine, sertraline, PAROxetine, thioridazine, venlafaxine)

NURSING CONSIDERATIONS

Assess:

• VS, B/P; check patients with cardiac disease more often for increased B/P

• **Hepatic injury:** May cause liver failure: monitor LFT; assess for jaundice, pruritus, flulike symptoms, upper right quadrant pain

⚠ Mental status: mood, sensorium, affect, stimulation, insomnia, aggressiveness, suicidal ideation in children/young adults

• Appetite, sleep, speech patterns

• For increased attention span, decreased hyperactivity with ADHD, growth rate weight, therapy may need to be discontinued

Evaluate:

• Therapeutic response: decreased hyperactivity (ADHD)

Teach patient/family:

• To avoid OTC preparations unless approved by prescriber, no tapering needed when discontinuing product

• To avoid alcohol ingestion

• To avoid hazardous activities until stabilized on medication

• To get needed rest; patients will feel more tired at end of day; not to take dose late in day, insomnia may occur

Black Box Warning: To report suicidal ideation

• To notify prescriber immediately if erection >4 hr

A

atorvastatin (Rx)

(a-tore'va-stat-in)

Lipitor

Func. class.: Antilipidemic

Chem. class.: HMG-CoA reductase inhibitor (statin)

Do not confuse:
Lipitor/Levatol

ACTION: Inhibits HMG-CoA reductase enzyme, which reduces cholesterol synthesis; high doses lead to plaque regression

USES: As adjunct for primary hypercholesterolemia (types Ia, Ib), dysbetalipoproteinemia, elevated triglyceride levels, prevention of CV disease by reduction of heart risk in those with mildly elevated cholesterol
Unlabeled uses: Atherosclerosis

CONTRAINDICATIONS: Pregnancy (X), breastfeeding, hypersensitivity, active hepatic disease
Precautions: Previous hepatic disease, alcoholism, severe acute infections, trauma, severe metabolic disorders, electrolyte imbalance

DOSAGE AND ROUTES

• **Adult: PO** 10-20 mg/day, usual range 10-80 mg/day, dosage adjustments may be made in 2-4 wk intervals, max 80 mg/day; patients who require >45% reduction in LDL may be started at 40 mg/day
Atherosclerosis (unlabeled)
• **Adult: PO** 80 mg/day
Available forms: Tabs 10, 20, 40, 80 mg
Administer:
• Total daily dose at any time of day without regard to meals

SIDE EFFECTS

CNS: Headache, asthenia
EENT: Lens opacities
GI: *Abdominal cramps, constipation, diarrhea, flatus, heartburn,* dyspepsia, liver dysfunction, pancreatitis, nausea, increased serum transaminase
GU: Impotence
INTEG: Rash, pruritus, alopecia; photosensitivity (rare)
MISC: Hypersensitivity
MS: Arthralgia, myalgia, rhabdomyolysis
RESP: Pharyngitis, sinusitis

PHARMACOKINETICS

Peak 1-2 hr, metabolized in liver, highly protein bound, excreted primarily in urine, half-life 14 hr, protein binding 98%

INTERACTIONS

Increase: rhabdomyolysis—azole antifungals, cycloSPORINE, erythromycin, niacin, gemfibrozil, clofibrate
Increase: serum level of digoxin
Increase: levels of oral contraceptives
Increase: levels of atorvastatin—erythromycin
Increase: effects of warfarin
Decrease: atorvastatin levels—colestipol
Drug/Herb
Decrease: effect—St. John's wort
Drug/Food
• Possible toxicity when used with grapefruit juice; oat bran may reduce effectiveness
Drug/Lab Test
Increase: bilirubin, alk phos, ALT, AST, CK
Interference: thyroid function tests

NURSING CONSIDERATIONS

Assess:
• **Hypercholesterolemia:** diet, obtain diet history including fat, cholesterol in diet; cholesterol triglyceride levels periodically during treatment; check lipid panel 6-12 wk after changing dose
• Hepatic studies q1-2mo, at initiation, 6, 12 wk after initiation or change in dose, periodically thereafter; AST, ALT, LFTs may be increased

• Renal studies in patients with compromised renal system: BUN, I&O ratio, creatinine
• Bowel status: constipation, stool softeners may be needed; if severe, add fiber, water to diet
⚠ **Rhabdomyolysis:** for muscle pain, tenderness, obtain CPK baseline; if markedly increased, product may need to be discontinued

Perform/provide:
• Storage in cool environment in tight container protected from light

Evaluate:
• Therapeutic response: decrease in LDL, total cholesterol, triglycerides, CAD; increase in HDL

Teach patient/family:
• That blood work and eye exam will be necessary during treatment
• To report blurred vision, severe GI symptoms, headache, muscle pain, weakness
• That previously prescribed regimen will continue: low-cholesterol diet, exercise program, smoking cessation
• Not to take product if pregnant (X), breastfeeding; to avoid alcohol
• To stay out of the sun; to use sunscreen, protective clothing to prevent photosensitivity (rare)

atovaquone (Rx)

(a-toe'va-kwon)

Mepron

Func. class.: Antiprotozoal

Chem. class.: Aromatic diamide derivative, analog of ubiquinone

ACTION: Interferes with DNA/RNA synthesis in protozoa

USES: *Pneumocystis jiroveci* infections in patients intolerant of trimethoprim-sulfamethoxazole, prophylaxis, *Toxoplasma gondii*, toxoplasmosis
Unlabeled uses: Babesiosis, malaria treatment/prophylaxis, toxoplasmosis prophylaxis, *Plasmodium* sp.

CONTRAINDICATIONS: Hypersensitivity or history of developing life-threatening allergic reactions to any component of the formulation, benzyl alcohol sensitivity
Precautions: Pregnancy (C), breastfeeding, neonates, hepatic disease, GI disease, respiratory insufficiency

DOSAGE AND ROUTES

Acute, mild, moderate
***Pneumocystis jiroveci* pneumonia**
• **Adult and adolescent 13-16 yr: PO** 750 mg with food bid for 21 days
***Pneumocystis jiroveci* pneumonia, prophylaxis**
• **Adult and adolescent: PO** 1500 mg/day with meal
Babesiosis (unlabeled)
• **Adult: PO** 750 mg q12hr with azithromycin (500-1000 mg on day 1 then 250 mg/day × 7-14 days)
Toxoplasmosis prophylaxis in AIDS (unlabeled)
• **Adult: PO** 1500 mg alone or in combination
***Plasmodium falciparum* (unlabeled)**
• **Adult: PO** 250 mg with proguanil daily
• **Child: PO** 17 mg/kg with proguanil daily
Available forms: Susp 750 mg/5 ml
Administer:
• With high-fat food to increase absorption of product and higher plasma concentrations
• Oral susp, shake before using
• All contents of foil pouch

SIDE EFFECTS

CNS: *Dizziness, headache, anxiety, insomnia,* asthenia, fever
CV: Hypotension
GI: *Nausea, vomiting, diarrhea,* anorexia, increased AST/ALT, acute pancreatitis, constipation, abdominal pain
HEMA: Anemia, neutropenia
INTEG: Pruritus, urticaria, *rash*
META: Hyperkalemia, hypoglycemia, hyponatremia
OTHER: Cough, dyspnea

PHARMACOKINETICS

Excreted unchanged in feces (94%), highly protein bound (99%), half-life 2-3 days

INTERACTIONS

Increase: level of—zidovudine, monitor for toxicity
Decrease: effect of atovaquone—rifampin, rifabutin, tetracycline, avoid concurrent use
Drug/Lab Test
Increase: AST, ALT, alk phos
Decrease: glucose, neutrophils, Hgb, sodium

NURSING CONSIDERATIONS

Assess:
Infection: WBC, vital signs; sputum baseline, periodically; obtain specimens needed before giving 1st dose
• Bowel pattern before, during treatment
• Respiratory status: rate, character, wheezing, dyspnea; risk for respiratory infection
• Allergies before treatment, reaction to each medication
Evaluate:
• Therapeutic response: decreased temp, ability to breathe
Teach patient/family:
• To take with food to increase plasma concentrations

atovaquone/proguanil

(a-toe'va-kwon)

Malarone

Func. class.: Antiprotozoal

Chem. class.: Aromatic diamide derivative

ACTION: The constituents of Malarone, atovaquone, and proguanil hydrochloride interfere with 2 different pathways involved in DNA/RNA synthesis in protozoa

USES: Malaria, malaria prophylaxis

CONTRAINDICATIONS: Hypersensitivity to this product, malaria prophylaxis in patients with severe renal impairment
Precautions: Pregnancy (C), breastfeeding, children, hepatic/GI/renal disease

DOSAGE AND ROUTES

Treatment of acute, uncomplicated *P. falciparum* malaria
Malarone adult strength tabs
• **Adult/adolescent/child >40 kg: PO** 4 adult strength tabs every day as a single dose × 3 consecutive days
• **Child 31-40 kg: PO** 3 adult strength tabs every day as a single dose × 3 consecutive days
• **Child 21-30 kg: PO** 2 adult strength tabs every day as a single dose × 3 consecutive days
• **Infant/child 11-20 kg: PO** 1 adult strength tab every day × 3 consecutive days
Malarone Pediatric Tabs
• **Infant/child 11-20 kg: PO** 4 pediatric tabs every day × 3 consecutive days
• **Infant/child 9-10 kg: PO** 3 pediatric tabs every day × 3 consecutive days
• **Infant/child 5-8 kg: PO** 2 pediatric tabs every day every 3 consecutive days
***P. falciparum* malaria prophylaxis, including chloroquine resistance areas**
• Each Malarone adult strength tab contains atovaquone 250 mg/proguanil 100 mg; Malarone Pediatric tablet contains atovaquone 62.5 mg/proguanil 25 mg
Malarone adult strength tabs
• **Adult/adolescent/child >40 kg: PO** 1 adult strength tab every day; begin prophylaxis 1-2 days before entering the endemic area; continue daily during the stay and for 7 days after leaving the area
Malarone Pediatric Tab
• **Child 31-40 kg: PO** 3 pediatric tabs every day; begin prophylaxis 1-2 days before entering the endemic area; continue daily during the stay and for 7 days after leaving the area

• **Child 21-30 kg: PO** 2 pediatric tabs every day; begin prophylaxis 1-2 days before entering the endemic area; continue daily during the stay and for 7 days after leaving the area
• **Infant/child 11-20 kg: PO** 1 pediatric tab every day; begin prophylaxis 1-2 days before entering the endemic area; continue daily during the stay and for 7 days after leaving the area

Available forms: Tabs (adult) 250 mg atovaquone/proguanil 100 mg; tabs (pediatric) 62.5 atovaquone/proguanil 25 mg

Administer
• Give with food or with milk or milk-based drink (nutritional supplement shake) to enhance oral absorption of atovaquone; food with high fat content is desired
• Give dose at the same time each day, administer a repeat dose if vomiting occurs within 1 hour after dosing
• Tabs may be crushed and mixed with condensed milk for children unable to swallow whole tablets

SIDE EFFECTS

CNS: *Dizziness, headache, anxiety, insomnia,* asthenia, fever
CV: Hypotension
GI: *Nausea, vomiting, diarrhea,* anorexia, increased AST/ALT, acute pancreatitis, constipation, abdominal pain
HEMA: Anemia, neutropenia
INTEG: Pruritus, urticaria, *rash*
META: Hyperkalemia, hypoglycemia, hyponatremia
OTHER: Cough, dyspnea

PHARMACOKINETICS

Atovaquone excreted unchanged in feces (94%), highly protein bound (99%), Protaguanil 75% protein bound, 40%-60% excreted in urine, hepatic metabolism; half-life 2-3 days

INTERACTIONS

Increase: Level of indinavir
Decrease: Effect of atovaquone-rifampin, rifabutin, tetracycline, metoclopramide
Increase: AST, ALT, alk phos
Decrease: Glucose, neutrophils, Hgb, sodium

NURSING CONSIDERATIONS

Assess:
• **Malaria:** Identify when the patient will be entering an area with malaria
• Bowel pattern before, during treatment
• Respiratory status: rate, character, wheezing, dyspnea; risk for respiratory infection
• Allergies before treatment, reaction to each medication
• CBC, LFTs, serum amylase, creatinine/BUN, sodium; increases in LFTs can persist for 4 wk after discontinuation of treatment

Evaluate:
Therapeutic response:
• Resolution/prevention of malaria

Teach patient/family:
• To take with food to increase plasma concentrations

RARELY USED

atracurium (Rx)

(a-tra-kyoor'ee-um)
Func. class.: Neuromuscular blocker (nondepolarizing)

USES: Facilitation of endotracheal intubation, skeletal muscle relaxation during mechanical ventilation, surgery, or general anesthesia

CONTRAINDICATIONS: Hypersensitivity

Black Box Warning: Respiratory insufficiency

DOSAGE AND ROUTES

• **Adult and child >2 yr: IV BOL** 0.4-0.5 mg/kg then 0.08-0.1 mg/kg 20-45 min after 1st dose if needed for prolonged

procedures; give smaller doses with halothane

- **Child 1 mo-2 yr: IV BOL** 0.3-0.4 mg/kg

⚠ HIGH ALERT

atropine (Rx)

(a'troe-peen)

Atreza, AtroPen, Sal-Tropine

Func. class.: Antidysrhythmic, anticholinergic parasympatholytic, antimuscarinic

Chem. class.: Belladonna alkaloid

Do not confuse:
atropine/Akarpine

ACTION: Blocks acetylcholine at parasympathetic neuroeffector sites; increases cardiac output, heart rate by blocking vagal stimulation in heart; dries secretions by blocking vagus

USES: Bradycardia <40-50 bpm, bradydysrhythmia, reversal of anticholinesterase agents, insecticide poisoning, blocking cardiac vagal reflexes, decreasing secretions before surgery, antispasmodic with GU, biliary surgery, bronchodilator, AV heart block
Unlabeled uses: Cardiac arrest, CPR, diarrhea, pulseless electrical activity, ventricular asystole, asthma

CONTRAINDICATIONS: Hypersensitivity to belladonna alkaloids, closed-angle glaucoma, GI obstructions, myasthenia gravis, thyrotoxicosis, ulcerative colitis, prostatic hypertrophy, tachycardia/tachydysrhythmias, asthma, acute hemorrhage, severe hepatic disease, myocardial ischemia, paralytic ileus
Precautions: Pregnancy (C), breastfeeding, children <6 yr, geriatric patients, renal disease, CHF, hyperthyroidism, COPD, hypertension, intraabdominal infection, Down syndrome, spastic paralysis, gastric ulcer

DOSAGE AND ROUTES

A

Bradycardia/bradydysrhythmia

- **Adult: IV BOL** 0.5-1 mg given q3-5min, max 3 mg
- **Child: IV BOL** 0.01 mg/kg up to 0.4 mg or 0.3 mg/m^2; may repeat q4-6hr; min dose 0.1 mg to avoid paradoxical reaction, max single dose 0.5 mg

Organophosphate poisoning

- **Adult and child: IM/IV** 1-2 mg hourly until muscarinic symptoms disappear; may need 6 mg every hr
- **Adult and child >90 lb, usually >10 yr: AtroPen** 2 mg
- **Child 40-90 lb, usually 4-10 yr: AtroPen** 1 mg
- **Child 15-40 lb: AtroPen** 0.5 mg
- **Infant <15 lb: IM/IV** 0.05 mg/kg q5-20min as needed

Presurgery

- **Adult and child >20 kg: SUBCUT/IM/IV** 0.4-0.6 mg 30-60 min before anesthesia
- **Child <20 kg: IM/SUBCUT** 0.01 mg/kg up to 0.4 mg ½-1 hr preop, max 0.6 mg/dose

Available forms: Inj 0.05, 0.1, 0.4, 0.5, 0.8, 1 mg/ml; tabs 0.4 mg; AtroPen 0.5, 1, 2 mg inj prefilled autoinjectors

Administer:

PO route

- Increased bulk, water in diet if constipation occurs
- Without regard to meals

IM route

- Atropine flush may occur in children and is not harmful

AtroPen

- Use no more than 3 AtroPen inj unless under the supervision of trained medical provider
- Use as soon as symptoms appear (tearing, wheezing, muscle fasciculations, excessive oral secretions)

IV route

- Undiluted or diluted with 10 ml sterile water; give at 0.6 mg/min through Y-tube or 3-way stopcock; do not add to IV sol; may cause paradoxical bradycardia for 2 min

Y-site compatibilities: Amrinone, etomidate, famotidine, heparin, hydrocortisone, meropenem, nafcillin, potassium chloride, sufentanil, vit B/C

SIDE EFFECTS

CNS: Headache, dizziness, involuntary movement, confusion, psychosis, anxiety, coma, flushing, drowsiness, insomnia, weakness; delirium (geriatric patients)
CV: Hypo/hypertension, paradoxical bradycardia, angina, PVCs, tachycardia, ectopic ventricular beats, bradycardia
EENT: Blurred vision, photophobia, glaucoma, eye pain, pupil dilation, nasal congestion
GI: Dry mouth, nausea, vomiting, abdominal pain, anorexia, constipation, paralytic ileus, abdominal distention, altered taste
GU: Retention, hesitancy, impotence, dysuria
INTEG: Rash, urticaria, contact dermatitis, dry skin, flushing
MISC: Suppression of lactation, decreased sweating, anaphylaxis

PHARMACOKINETICS

Half-life 2-3 hr, terminal 12.5 hr, excreted by kidneys unchanged (70%-90% in 24 hr), metabolized in liver, 40%-50% crosses placenta, excreted in breast milk
PO: Onset $^1/_2$-2 hr, peak $^1/_2$-1 hr, duration 4-6 hr, well absorbed
IM/SUBCUT: Onset 15-50 min, peak 30 min, duration 4-6 hr, well absorbed
IV: Peak 2-4 min, duration 4-6 hr

INTERACTIONS

Increase: Mucosal lesions—potassium chloride tab
Increase: anticholinergic effects—tricyclics, amantadine, antiparkinson agents
Decrease: absorption—ketoconazole, levodopa
Decrease: effect of atropine—antacids

NURSING CONSIDERATIONS

Assess:
- I&O ratio; check for urinary retention, daily output
- **ECG** for ectopic ventricular beats, PVC, tachycardia in cardiac patients
- For bowel sounds, constipation
- Respiratory status: rate, rhythm, cyanosis, wheezing, dyspnea, engorged neck veins
- **Increased intraocular pressure:** eye pain, nausea, vomiting, blurred vision, increased tearing
- Cardiac rate: rhythm, character, B/P continuously
- Allergic reaction: rash, urticaria

Evaluate:
- Therapeutic response: decreased dysrhythmias, increased heart rate, secretions; GI, GU spasms; bronchodilation

Teach patient/family:
- To report blurred vision, chest pain, allergic reactions, constipation, urinary retention, to use sunglasses to protect the eyes
- Not to perform strenuous activity in high temperatures; heat stroke may result
- To take as prescribed; not to skip or double doses
- Not to operate machinery if drowsiness occurs
- Not to take OTC products without approval of prescriber
- Not to freeze or expose to light (Atro-Pen)

TREATMENT OF OVERDOSE:

O_2, artificial ventilation, ECG; administer DOPamine for circulatory depression; administer diazepam or thiopental for seizures; assess need for antidysrhythmics

atropine ophthalmic
See Appendix B

RARELY USED

auranofin (Rx)

(au-rane'oh-fin)

Ridaura

Func. class.: Antiinflammatory, gold compound

Do not confuse:
Ridaura/Cardura

USES: RA; not for 1st-line therapy
Unlabeled uses: SLE, psoriatic arthritis, pemphigus

CONTRAINDICATIONS: Breastfeeding, children <6 yr, hypersensitivity to gold, necrotizing enterocolitis, pulmonary fibrosis, exfoliative dermatitis, recent radiation therapy, renal/hepatic disease, marked hypertension, uncontrolled CHF

Black Box Warning: Bone marrow suppression, blood dyscrasias, hematuria, anemia, diarrhea

DOSAGE AND ROUTES

- **Adult: PO** 6 mg/day or 3 mg bid; may increase to 9 mg/day after 3 mo

avanafil

(a-van'a-fil)

Stendra

Func. class.: Impotence agent
Chem. class.: Phosphodiesterase type 5 inhibitor

ACTION: Inhibits phosphodiesterase type 5 (PDE5); enhances erectile function by increasing the amount of cGMP causing smooth muscle relaxation and increasing blood flow to the corpus cavernosum

USES: Treatment of erectile dysfunction

CONTRAINDICATIONS: Hypersensitivity, severe renal/hepatic disease, current nitrates/nitrites, patients <18 yr
Precautions: Pregnancy (C) although not indicated for women, anatomic penile deformities, sickle cell anemia, leukemia, multiple myeloma, renal/hepatic/CV disease, bleeding disorders, active peptic ulcer, prolonged erection, aortic stenosis, HIV, stroke, geriatric patients, tinnitus, MI, visual disturbances, retinitis pigmentosa

DOSAGE AND ROUTES

Erectile dysfunction

- **Adult: PO** 100 mg 30 min before sexual activity, dose may be reduced to 50 mg or increased to 200 mg; usual max dose frequency is 1 time/day

Potent CYP3A4 inhibitors/nitrates

- Do not use

Moderate CYP3A4 inhibitors/alpha-blockers

- **Adult: PO** Max 50 mg/day

Hepatic dosage/severe renal disease

- **Adult: Child–Pugh C: PO** not recommended

Available forms: Tabs 50, 100, 200 mg
Administer
PO route

- May be taken 30 min before sexual activity on an as-needed basis, but no more than once per day
- May be used without regard to meals
- Products should not be used with nitrates/nitrates or strong CYP3A4 inhibitors

SIDE EFFECTS

CNS: *Headache, flushing*
EENT: Nasal congestion, nasopharyngitis
MISC: Back pain

PHARMACOKINETICS

99% protein binding, metabolized by CYP3A4, excreted as metabolites; urine 62%; 21% feces, half-life 5 hr, peak 45 min

INTERACTIONS

Do not use with nitrates/nitrites because of unsafe drop in B/P, which could result in MI, stroke

Do not use with strong CYP3A4 inhibitors (ketoconazole, ritonavir, atazanavir, clarithromycin, indivinavir, itraconazole, nefazodone, nelfinavir, saquinavir, telithromycin)

Increase: Avanafil level—moderate CYP3A4 inhibitors (erythromycin, amprenavir, aprepitant, diltiazem, fluconazole, fosamprenavir, verapamil)

Decrease: B/P—alcohol, alpha-blockers, amLODIPine

Increase: Avanafil effect—grapefruit juice

NURSING CONSIDERATIONS

Assess:

Erectile dysfunction: Assess for underlying cause before treatment; use of organic nitrates that should not be used with this product; any loss of vision/hearing while taking this product, hypersensitivity reactions

Evaluate:

Therapeutic response: Ability to engage in sexual intercourse

Teach patient/family:

- Sexual dysfunction: May be taken 30 min before sexual activity on an as-needed basis, but no more than once per day
- May be used without regard to meals

⚠ That products should not be used with nitrates/nitrates, or strong CYP3A4 inhibitors

- That product does not protect against sexually transmitted disease including HIV
- That product has no effect in the absence of sexual stimulation, to seek help if erection lasts >4 hr
- To tell prescriber about all medication, vitamins, herbs being taken, especially ritonavir, indinavir, ketoconazole, itraconazole, erythromycin, nitrates, α-blockers
- Not to drink large amounts of alcohol

⚠ To notify prescriber immediately and to stop taking product if vision or hearing loss occurs, if erection lasts >4 hr, or if chest pain occurs

axitinib

Inlyta

Func. class.: Antineoplastics, biologic response modifiers, signal transduction inhibitors (STIs)

Chem. class.: Tyrosine kinase inhibitor

ACTION: Inhibits receptor tyrosine kinases including vascular endothelial growth factor receptors (VEGFR)-1, VEGFR-2, and VEGFR-3; inhibits tumor growth and phosphorylation of VEGFR-2 and VEGF-mediated endothelial cell proliferation

USES: Treatment of advanced renal cell cancer after failure of 1 prior systemic therapy

CONTRAINDICATIONS: Pregnancy (D), breastfeeding

Precautions Risk for or history of thromboembolic disease, recent bleeding, untreated brain metastasis, recent GI bleeding, GI perforation, fistula, surgery, moderate hepatic disease, uncontrolled hypertension, hyper/hypothyroidism, proteinuria, infertility, end-stage renal disease (CrCl <15 ml/min); not intended for use in adolescents, children, infants, neonates

DOSAGE AND ROUTES

- **Adult:** PO 5 mg bid (at 12 hr intervals), may increase to 7 mg bid and then to 10 mg bid in those not receiving antihypertensives who tolerate the lower dosage for at least 2 consecutive wk with no more than grade 2 adverse reactions. Reduce to 3 mg bid if a dose reduction is needed; if further reduction is necessary, reduce to 2 mg bid

• **Adult receiving a strong CYP 3A4/5 inhibitor:** Reduce dose by 1/2, adjust as needed

Administer:

• Give with or without food; swallow tablet whole with a glass of water

• If patient vomits or misses a dose, an additional dose should not be taken; the next dose should be taken at the usual time

SIDE EFFECTS

CNS: Dizziness, headache, reversible posterior leukoencephalopathy syndrome (RPLS), fatigue

CV: Hypertension, arterial thromboembolic events (ATE), venous thromboembolic events (VTE)

ENDO: Hypothyroidism, hyperthyroidism

GI: Lower GI bleeding/perforation/fistula, abdominal pain, constipation, diarrhea, dysgeusia, dyspepsia, dysphonia, hemorrhoids, nausea, mucosal inflammation, stomatitis, vomiting, increased ALT/AST

GU: Proteinuria

HEMA: Bleeding intracranial bleeding, anemia, polycythemia, decreased/increased hemoglobin, lymphopenia thrombocytopenia, neutropenia

INTEG: Palmar-plantar erythrodysesthesia (hand and foot syndrome) rash, dry skin, pruritus, alopecia, erythema

MISC: Weight loss dehydration metabolic and electrolyte laboratory abnormalities included

MS: Asthenia, arthralgia, musculoskeletal pain, myalgia

RESP: Cough, dyspnea

PHARMACODYNAMICS

Absorption: bioavailability 58%; distribution: protein binding >99%; metabolized in liver by CYP3A4/5, CYP1A2, CYP2C19, and UGT1A1; metabolites are carboxylic acid, sulfoxide, and N-glucuronide; excretion 41% in feces and 23% in urine, 12% unchanged; half-life: 2.5-6.1 hr; steady state 2-3 days; onset unknown, peak 2.5-4.1 hr, increased in moderate hepatic disease; duration unknown

INTERACTIONS

Increase: effect of axitinib—CYP3A4/5 inhibitor, strong, moderate (ketoconazole, boceprevir, chloramphenicol, conivaptan, delavirdine, fosamprenavir, imatinib, indinavir, isoniazid itraconazole, dalfopristin, quinupristin, posaconazole, ritonavir, telithromycin, tipranavir (boosted with ritonavir), darunavir (boosted with ritonavir), aldesleukin, IL-2, amiodarone, aprepitant, fosaprepitant atazanavir, bromocriptine, clarithromycin, crizotinib, danazol, diltiazem, dronedarone, erythromycin, fluvoxaMINE, lanreotide, lapatinib, miconazole, mifepristone, nefazodone, nelfinavir, niCARdipine, octreotide, pantoprazole, saquinavir, tamoxifen, verapamil, voriconazole, grapefruit juice)

Decrease: effect of axitinib—CYP3A4/5 inducers, strong/moderate (rifampin, carBAMazepine, dexamethasone, phenytoin, PHENobarbital, rifabutin, rifapentine, St. John's wort, ethanol, bexarotene, bosentan, efavirenz, etravirine, griseofulvin, metyrapone, modafinil, nafcillin, nevirapine, OXcarbazepine, vemurafenib, pioglitazone, topiramate)

Increase or decrease: effect of axitinib—CYP3A4/5 inhibitor and inducers (quiNINE)

Drug/Lab Test

Increase: creatinine, lipase, amylase, sodium, potassium, glucose

Decrease: bicarbonate, calcium, albumin, glucose, phosphate, sodium

Increase or decrease: sodium, glucose

Drug/Herb

Decrease: effect of axitinib—St. John's wort

NURSING CONSIDERATIONS

Assess:

• **Bleeding:** monitor for GI bleeding or perforation; temporarily discontinue therapy if a patient develops any bleeding that requires treatment

• **Surgery:** discontinue ≥24 hr before surgery, may be resumed after adequate wound healing

• **Hepatic/renal disease:** dosage should be reduced in patients with moderate (Child-Pugh Class B) hepatic disease, monitor liver function tests (ALT, AST, bilirubin) before and periodically during therapy; monitor CCr before and during treatment

• **Hypertension:** B/P should be well controlled before starting treatment; monitor patients for hypertension and administer antihypertensive therapy as needed before and during therapy; dose should be reduced for persistent hypertension; therapy should be discontinued if B/P remains elevated after a dosage reduction or if there is evidence of hypertensive crisis; after discontinuation monitor B/P for hypotension in those receiving antihypertensives

• **Hyper/hypothyroidism:** monitor thyroid function tests before and periodically during therapy; thyroid disease should be treated with thyroid medications

• Monitor for proteinuria before and periodically during therapy; product may need to be decreased or discontinued if moderate to severe proteinuria occurs

⚠ **Pregnancy/breastfeeding:** pregnancy category D; determine if the patient is pregnant or breastfeeding before using this product; may also cause infertility

Perform/provide:

• Storage at room temperature

Evaluate:

• Decreased spread of malignancy

Teach patient/family:

⚠ To use contraception during treatment (pregnancy category D) or to avoid use of this product; to notify prescriber if pregnancy is planned to suspected, not to breastfeed

⚠ To notify prescriber of bleeding that is severe or that requires treatment

• That product will be discontinued ≥24 hr before surgery; may be resumed after adequate wound healing

• That laboratory testing will be required before and periodically during product use

• How to monitor B/P and that B/P products should be continued as directed by prescriber

⚠ HIGH ALERT

azaCITIDine (Rx)

(a-za-sie-ti'deen)

Vidaza

Func. class.: Antineoplastic-nucleoside analog

Chem. class.: DNA demethylation agent

Do not confuse:

azaCITIDine/azaTHIOprine

ACTION: Cytotoxic by producing damage to double-strand DNA during DNA synthesis

USES: Myelodysplastic syndrome (MDS)

Unlabeled uses: Acute myelogenous leukemia (AML), chronic myelogenous leukemia (CML)

CONTRAINDICATIONS: Pregnancy (D), hypersensitivity to product or mannitol, advanced malignant hepatic tumors

Precautions: Breastfeeding, children, geriatric patients, renal/hepatic disease, baseline albumin <30 g/L; a man should not father a child while taking product

DOSAGE AND ROUTES

• **Adult: SUBCUT/IV** 75 mg/m²/day × 7 days q4wk, dose may be increased to 100 mg/m² if no response seen after 2 treatment cycles; minimum treatment, 4 cycles

Available forms: Powder for inj 100 mg

Administer:

• Use cytotoxic handling procedures

SUBCUT route

• **Reconstitute** with 4 ml sterile water for inj (25 mg/ml), inject diluents slowly

into vial, invert vial 2-3 times, gently rotate; sol will be cloudy, use immediately; divide doses >4 ml into 2 syringes; invert contents 2-3 times, gently roll syringe between the palms for 30 sec immediately before administration, rotate inj site

Intermittent IV INF route

• **Reconstitute** each vial with 10 ml sterile water for inj, shake well until all solids are dissolved, withdraw sol (10 mg/ml), inject in 50-100 NS or LR inf run over 10-40 min

SIDE EFFECTS

CNS: *Anxiety, depression, dizziness, fatigue, headache, fever, insomnia*
CV: Cardiac murmur, hypotension, tachycardia, peripheral edema, *chest pain*
GI: *Diarrhea, nausea, vomiting,* anorexia, *constipation,* abdominal pain, distention, tenderness, hemorrhoids, mouth hemorrhage, tongue ulceration, stomatitis, dyspepsia, **hepatotoxicity, hepatic coma**
GU: **Renal failure, renal tubular acidosis,** dysuria, UTI
HEMA: **Leukopenia, anemia, thrombocytopenia, neutropenia, febrile neutropenia,** ecchymosis, petechiae
INTEG: *Irritation at site, rash,* sweating, pyrexia, pruritus
META: Hypokalemia
MS: Weakness, arthralgia, muscle cramps, myalgia, back pain
RESP: Cough, *dyspnea, pharyngitis,* **pleural effusion**

PHARMACOKINETICS

Rapidly absorbed, peak ½ hr, metabolized in the liver, half-life 4 hr, excreted in urine

INTERACTIONS

Increase: bone marrow depression—other antineoplastics

NURSING CONSIDERATIONS

A

Assess:

• For CNS symptoms: fever, headache, chills, dizziness

• **Bone marrow suppression/hematologic response:** CBC with differential, baseline WBC ≥3000/mm³, absolute neutrophil count (ANC) ≥1500/mm³, platelets >7500/mm³, adjust dose based on nadir; ANC <500/mm³, platelets <25,000/mm³, give 50% dose next course; ANC 500-1500/mm³, platelets 25,000-50,000/mm³, give 67% next course; bruising, bleeding, blood in stools, urine, sputum, emesis; myelodysplastic syndrome (MDS), splenomegaly

• Buccal cavity q8hr for dryness, sores, or ulceration, white patches, oral pain, bleeding, dysphagia

• **Myelodysplastic syndrome:** severe anemia, cytopenias, splenomegaly

• Blood studies: BUN, bicarbonate, creatine, LFTs

Perform/provide:

• Increased fluid intake to 2-3 L/day to prevent dehydration unless contraindicated

• Rinsing of mouth tid-qid with water, club soda; brushing of teeth bid-tid with soft brush or cotton-tipped applicator for stomatitis; use unwaxed dental floss

• Nutritious diet with iron, vitamin supplement, low fiber, few dairy products

Evaluate:

• Therapeutic response: improvement in blood counts with refractory anemia or refractory anemia with excess blasts

Teach patient/family:

• To avoid crowds, persons with known infections; not to receive immunizations

• To avoid foods with citric acid or hot or rough texture if stomatitis is present; to drink adequate fluids

• To report stomatitis; any bleeding, white spots, ulcerations in mouth; to examine mouth daily, report symptoms, infection site reactions, pruritus, fever

• To use contraception during and for several months after therapy (pregnancy [D]); not to breastfeed; not to father a child while receiving product

azaTHIOprine (Rx)

(ay-za-thye'oh-preen)

Azasan, Imuran

Func. class.: Immunosuppressant

Chem. class.: Purine antagonist

Do not confuse:
Imuran/Imferon/Elmiron/IMDUR/Enduron/Tenormin
azaTHIOprine/azaCITIDine

ACTION: Produces immunosuppression by inhibiting purine synthesis in cells

USES: Renal transplants to prevent graft rejection, refractory rheumatoid arthritis
Unlabeled uses: Myasthenia gravis, chronic ulcerative colitis, Crohn's disease, Behçet's disease, autoimmune hepatitis, dermatomyositis, thrombocytopenic purpura, lupus nephritis, polymyositis, pulmonary fibrosis, systemic lupus erythematosus (SLE), Wegener's granulomatosis, vasculitis, atopic dermatitis

CONTRAINDICATIONS: Pregnancy (D), hypersensitivity, breastfeeding
Precautions: Severe renal/hepatic disease, geriatric patients, thiopurine methyltransferase deficiency, infection

Black Box Warning: Bone marrow suppression, neoplastic disease, must be used by experienced clinician

DOSAGE AND ROUTES

Prevention of rejection
• **Adult and child: IV** 3-5 mg/kg/day then maintenance **(PO)** of ≥ 1-3 mg/kg/day
Refractory rheumatoid arthritis
• **Adult: PO** 1 mg/kg/day, may increase dose after 2 mo by 0.5 mg/kg/day and then q4wk, max 2.5 mg/kg/day
Lupus nephritis/SLE/Wegener's granulomatosis/idiopathic pulmonary fibrosis (unlabeled)
• **Adult: PO** 2-3 mg/kg/day
Atopic dermatitis (unlabeled)
• **Adult/adolescent ≥16 yr: PO** 2.5 mg/kg/day
Available forms: Tabs 50, 75, 100 mg; inj 100 mg
Administer:
• For several days before transplant surgery
• All medications PO if possible; avoid IM inj because bleeding may occur
PO route
• With meals to reduce GI upset
IV route
• Prepare in biologic cabinet with gown, gloves, mask
Direct IV
• **Dilute** to 10 mg/ml with 0.9% NaCl, 0.45% NaCl, D_5W, **give** over 5 min
Intermittent IV INF route
• **Reconstitute** 100 mg/10 ml of sterile water for inj; rotate to dissolve; **further dilute** with 50 ml or more saline or glucose in saline, **give** over $^1/_2$-1 hr

Y-site compatibilities: Alfentanil, atracurium, atropine, benztropine, calcium gluconate, cycloSPORINE, enalaprilat, epoetin alfa, erythromycin, fentaNYL, fluconazole, folic acid, furosemide, glycopyrrolate, heparin, insulin, mannitol, mechlorethamine, metoprolol, naloxone, nitroglycerin, oxytocin, penicillin G, potassium chloride, propranolol, protamine, SUFentanil, trimetaphan, vasopressin
Solution compatibilities: D_5W, NaCl 0.9%, NaCl 0.45%

SIDE EFFECTS

GI: *Nausea, vomiting,* stomatitis, esophagitis, pancreatitis, hepatotoxicity, jaundice, hepatic veno-occlusive disease
HEMA: Leukopenia, thrombocytopenia, anemia, pancytopenia, bleeding
INTEG: Rash, alopecia
MISC: Serum sickness, Raynaud's symptoms, secondary malignancy, infection
MS: Arthralgia, muscle wasting

PHARMACOKINETICS

Metabolized in liver, excreted in urine (active metabolite), crosses placenta, half-life 3 hr

INTERACTIONS

Increase: leukopenia—ACE inhibitors, sulfamethoxazole-trimethoprim
Increase: myelosuppression—cycloSPORINE, mercaptopurine
Increase: action of azaTHIOprine—allopurinol
Decrease: immune response—vaccines, toxoids
Decrease: action of warfarin—warfarin
• Do not admix with other products
Drug/Lab Test
Increase: LFTs
Decrease: uric acid
Interference: CBC, differential count

NURSING CONSIDERATIONS

Assess:
• **For infection:** increased temp, WBC; sputum, urine
• I&O, weight daily, report decreasing urine output; toxicity may occur

Black Box Warning: Bone marrow suppression: severe leukopenia, pancytopenia, thrombocytopenia; Hgb, WBC, platelets during treatment monthly; if leukocytes are $<3000/mm^3$ or platelets $<100,000/mm^3$, product should be discontinued, CBC

Hepatotoxicity: if dark urine, jaundice, itching, light-colored stools, increased LFTs, product should be discontinued; hepatic studies: alk phos, AST, ALT, bilirubin
• **Arthritis:** pain, ROM, swelling, mobility before, during treatment
Evaluate:
• Therapeutic response: absence of graft rejection, immunosuppression in autoimmune disorders
Teach patient/family:
• To take as prescribed; not to miss doses; if dose is missed on daily regimen, to skip dose; if taking multiple doses/day, to take as soon as remembered
• That therapeutic response may take 3-4 mo with RA; to continue with prescribed exercise, rest, other medications
• To report fever, rash, severe diarrhea, chills, sore throat, fatigue because **serious infections** may occur; report unusual bleeding, bruising; signs/symptoms of **renal/hepatic toxicity**
• To use contraceptive measures during treatment, for 16 wk after ending therapy (pregnancy [D]); to avoid vaccinations
• To avoid crowds to reduce risk for infection
• To take with food to decrease GI intolerance
• On multiple significant drug-drug interactions
• To use soft-bristled toothbrush to prevent bleeding
• That treatment is ongoing to prevent transplant rejection

azelaic acid

(aze-eh-lay'ik)

Azelex, Finacea

Func. class.: Antiacne agent
Chem. class.: Dicarboxylic acid

ACTION: Active for *Staphylococcus epidermidis, Propionibacterium acnes* by inhibiting microbial protein synthesis in the cell

USES: Mild to moderate inflammatory acne vulgaris, rosacea

CONTRAINDICATIONS: Hypersensitivity
Precautions: Pregnancy (B), breastfeeding; patients with dark complexions should be monitored for early signs of hypopigmentation

DOSAGE AND ROUTES

Adult/child ≥12 yr:
• Apply a thin film and massage into affected areas bid am and pm

Available forms:
Cream 20%, Gel 15%
Administer
• Before applying, the affected areas should be thoroughly washed and patted dry. Then apply cream or gel and massage gently into the affected areas. Occlusive dressings or wrappings should not be used. Wash hands after applying.
• Do not apply to the eye; avoid contact with the mouth, eyes, and other mucous membranes. If contact with the eye(s) occur, the eye(s) should be washed with large amounts of water; contact prescriber if ocular irritation persists.
• Avoid concurrent use of alcoholic cleansers, astringents, abrasives, and peeling agents.
• Store at room temperature, do not freeze.

SIDE EFFECTS

MISC: Allergic reaction
SKIN: Itching, burning, stinging, dermatitis, peeling, erythema, edema, acne

PHARMACOKINETICS

Onset, peak, duration unknown; half-life 12 hr

NURSING CONSIDERATIONS

Assess
• Skin: assess for redness, irritation, stinging; if severe, product might need to be discontinued
• Hypopigmentation: In patients with dark complexion
Evaluate
• Therapeutic response: Decreased acne lesions
Teach patient/family:
• To thoroughly wash and pat dry the affected areas before applying product. Apply cream or gel and massage gently into the affected areas. Occlusive dressings or wrappings should not be used. Wash hands after applying.
• Not to apply to the eye; avoid contact with the mouth, eyes, and other mucous membranes. If contact with the eyes occurs, wash with large amounts of water; contact prescriber if ocular irritation persists.
• To avoid concurrent use of alcoholic cleansers, astringents, abrasives, and peeling agents.
• To store at room temperature, not to freeze
• To use for prescribed amount of time
• To report burning, stinging, irritation
• To report change in skin color

azelastine (ophthalmic)

(ah-zell'ah-steen)
Optivar
Func. class.: Antihistamine (ophthalmic)
Chem. class.: H_1 receptor antagonist

ACTION: Decreases the allergic response by inhibiting histamine release

USES: Pruritus from allergic conjunctivitis

CONTRAINDICATIONS: Hypersensitivity
Precautions: Pregnancy (C), breastfeeding, child <3 yr

DOSAGE AND ROUTES

• **Adult/child ≥3 yr: OPHTH** 1 drop into each affected eye bid
Available forms: Ophthalmic sol: 0.05%
Administer
• Tip of dropper should not touch the eye
• Store upright and tightly closed at room temperature

SIDE EFFECTS

CNS: Headache
EENT: Eye burning/stinging/irritation, blurred vision, rhinitis, bitter taste
INTEG: Pruritus
RESP: Asthma, dyspnea, wheezing

A

PHARMACOKINETICS

Onset 3 min, duration 8 hr, half-life 22 hr, protein binding 88%

NURSING CONSIDERATIONS

Assess:
- Eyes: for itching, redness, use of soft or hard contact lenses

Evaluate:
- Therapeutic response: Absence of redness, itching in the eyes

Teach patient/family:
- To use in the eyes only; not to touch dropper to eye/eyelid
- Not to wear contact lenses if eyes are red and itching
- To wait at least 10 min before inserting contact lenses, soft contact lenses can absorb preservative

azelastine nasal agent

See Appendix B

azilsartan

Edarbi

Func. class.: Antihypertensive

Chem. class.: Angiotensin II receptor antagonist

ACTION: Antagonizes angiotensin II at the AT_1 receptor in tissues like vascular smooth muscle and the adrenal gland. Two angiotensin II receptors, AT_1 and AT_2, have been identified; azilsartan exhibits more than 10,000-fold greater affinity for the AT_1 receptor than the AT_2 receptor.

USES: Hypertension, alone or in combination with other antihypertensives

CONTRAINDICATIONS:

Black Box Warning: Pregnancy (D) 2nd/3rd trimesters

Precautions: Pregnancy (C) 1st trimester, breastfeeding, children, geriatric patients, angioedema, African descent, renal disease, renal artery stenosis, heart failure, hypovolemia

DOSAGE AND ROUTES:

- **Adult: PO** 80 mg/day, may give an initial dose of 40 mg/day in patients receiving high-dose diuretic therapy

Available forms: Tabs 40, 80 mg

Administer:
- May administer without regard to food

SIDE EFFECTS

CNS: Dizziness, fatigue, asthenia
CV: Hypotension, orthostatic hypotension
GI: Nausea, diarrhea
HEMA: Anemia
INTEG: Angioedema
MS: Muscle cramps
RESP: Cough
SYST: Secondary malignancy

PHARMACOKINETICS:

Protein binding >99% to serum albumin; metabolized by CYP2C9; elimination half-life 11 hr, steady state within 5 days and no accumulation in plasma occurs with once-daily dosing; elimination 55% in feces, 42% in urine; hydrolyzed to the active metabolite, azilsartan, in GI tract during absorption, rapidly absorbed, peak 1.5-3 hr; absolute bioavailability (60%) not affected by food

INTERACTIONS:

Increase: hypotensive effect—other antihypertensives, other angiotensin receptor antagonists, MAOIs
Increase: hypoglycemia—antidiabetics
⚠ **Increase:** renal failure risk—cyclosporine, diuretics, NSAIDs in those with poor renal function; monitor closely
⚠ **Increase:** lithium toxicity—lithium
⚠ **Increase:** phosphate nephropathy—sodium phosphate monobasic monohydrate; sodium phosphate dibasic anhydrous

Drug/Herb:
Increase: antihypertensive effect—Hawthorn
Decrease: antihypertensive effect—ephedra

NURSING CONSIDERATIONS

Assess:
⚠ **Angioedema:** Assess for facial swelling, difficulty breathing

Black Box Warning: For pregnancy (D) 2nd/3rd trimester, can cause fetal death

- Response and adverse reactions especially in renal disease
- B/P, pulse when beginning therapy and periodically thereafter; note rhythm, rate, quality; obtain electrolytes before beginning therapy

Perform/provide:
- Use original package to protect from light and moisture beat

Evaluate:
- Therapeutic response: decreased B/P

Teach patient/family:
- To comply with dosage schedule even if feeling better

⚠ To notify prescriber of facial swelling; if pregnancy is planned or suspected (category D 2nd/3rd trimester)

- That diarrhea, dehydration, excessive perspiration, vomiting, may lead to fall in B/P; to consult prescriber if these occur
- To rise slowing from lying or sitting to minimize orthostatic hypotension; that product may cause dizziness
- To avoid OTC medications unless approved by prescriber; to inform all health care providers of product use
- To use proper technique for obtaining B/P

azithromycin (Rx)

(ay-zi-thro-my'sin)
Zithromax, Zmax, Zithromax Tri Pak, Zithromax Z Pak
Func. class.: Antiinfective
Chem. class.: Macrolide (azalide)

Do not confuse:
azithromycin/erythromycin
Zithromax/Zinacef

ACTION: Binds to 50S ribosomal subunits of susceptible bacteria and suppresses protein synthesis; much greater spectrum of activity than erythromycin; more effective against gram-negative organisms

USES: Mild to moderate infections of the upper respiratory tract, lower respiratory tract; uncomplicated skin and skin structure infections caused by *Moraxella catarrhalis, Streptococcus pneumoniae, Streptococcus pyogenes, Staphylococcus aureus, Streptococcus agalactiae, Mycoplasma pneumoniae, Haemophilus influenzae, Clostridium, Legionella pneumophila;* NGU or cervicitis due to *Chlamydia trachomatis;* in children: acute otitis media *(H. influenzae, M. catarrhalis, S. pneumoniae)* **PO;** acute pharyngitis/tonsillitis (group A streptococcal) **PO;** acute skin/soft tissue infections **PO;** community-acquired pneumonia *(Chlamydia pneumoniae, H. influenzae, M. pneumoniae, S. pneumoniae)* **PO;** pharyngitis/tonsillitis *(S. pyogenes);* prophylaxis of disseminated *Mycobacterium avium* complex (MAC)

Unlabeled uses: Babesiosis, cholera, cystic fibrosis, dental abscess/infection, endocarditis prophylaxis, granuloma inguinale, *Helicobacter pylori, Klebsiella granulomatis,* Legionnaire's disease, Lyme disease, lymphogranuloma venereum, MAC, *Mycoplasma hominis,* periodontitis, pertussis, prostatitis, *Rickettsia tsutsugamushi, Salmonella typhi,*

shigellosis, syphilis, toxoplasmosis, typhoid fever

CONTRAINDICATIONS:

Hypersensitivity to azithromycin, erythromycin, any macrolide

Precautions: Pregnancy (B), breastfeeding; geriatric patients; renal/hepatic/cardiac disease; <6 mo for otitis media; <2 yr for pharyngitis, tonsillitis

DOSAGE AND ROUTES

Most infections

• **Adult: PO** 500 mg on day 1 then 250 mg/day on days 2-5 for a total dose of 1.5 g or 500 mg a day × 3 days

• **Child 2-15 yr: PO** 10 mg/kg on day 1 then 5 mg/kg × 4 days

Disseminated MAC infections

• **Adult: PO** 600 mg/day with ethambutol 15 mg/kg/day

Pelvic inflammatory disease

• **Adult: PO/IV** 500 mg **IV** q24hr × 2 doses then 500 mg **PO** q24hr × 7-10 days

Cervicitis, chlamydia, chancroid, nongonococcal urethritis, syphilis

• **Adult: PO** 1 g single dose

Gonorrhea

• **Adult: PO** 2 g single dose

Lower respiratory tract infections

• **Adult: PO** 500 mg day 1, then 250 mg × 4 days

• **Child: PO** 5-12 mg/kg/day × 5 days

Acute otitis media

• **Child >6 mo: PO** 30 mg/kg as a single dose or 10 mg/kg/day × 3 days or 10 mg/kg as a single dose on day 1 (max 500 mg/day) then 5 mg/kg on days 2-5 (max 250 mg/day)

Prevention of acute otitis media

• **Child: PO** 10 mg/kg q wk × 6 mo

Bacterial conjunctivitis

• **Adult/adolescent/child ≥1 yr: OPHTHALMIC** 1 drop in affected eye BID ×2 days, then 1 drop × next 5 days

Legionnaire's disease/early Lyme disease (unlabeled)

• **Adult: PO** 500 mg/day

Pertussis (unlabeled)

• **Adult: PO** 500 mg on day 1 then 250 mg/day for 2-5 days

• **Infant <6 mo: PO** 10 mg/kg/day × 5 days

Available forms: Tabs 250, 500, 600 mg; powder for inj 500 mg; susp 100, 200 mg/5 ml 1 g single-dose powder for susp; ext rel powder for susp 2 g; ophthalmic drops 1% solution

Administer:

PO route

• **Susp** 1 hr before meal or 2 hr after meal; reconstitute 1 g packet for susp with 60 ml water, mix, rinse glass with more water and have patient drink to consume all medication; packets not for pediatric use

Intermittent IV INF route

• **Reconstitute** 500 mg of product with 4.8 ml sterile water for inj (100 mg/ml); shake, **dilute** with 250 or 500 ml 0.9% NaCl, 0.45% NaCl, or LR to 1-2 mg/ml; diluted sol stable for 24 hr or 7 days if refrigerated

• **Give** 1 mg/ml sol over 3 hr or 2 mg/ml sol over 1 hr; never give IM or as bolus

Y-site compatibilities: Aminocaproic acid, amphotericin B liposome, anidulafungin, atenolol, bivalirudin, bleomycin, CARBOplatin, CISplatin, cytarabine, DAPTOmycin, dexmedetomidine, diphenhydrAMINE, docetaxel, dolasetron, doripenem, doxacurium, droperidol, epirubicin, eptifibatide, ertapenem, fenoldopam, fluorouracil, IDArubicin, irinotecan, methochlorethamine, meperidine, nesiritide, octreotide, ondansetron, oxaliplatin, palonosetron, pamidronate, pantoprazole, pemetrexed, rocuronium, sodium acetate, tigecycline, tirofiban, TPN, vasopressin, vinCRIStine, voriconazole

SIDE EFFECTS

CNS: Dizziness, headache, vertigo, somnolence, myasthenia gravis

CV: Palpitations, chest pain

EENT: Hearing loss, tinnitus, loss of smell (anosmia)

GI: *Nausea, vomiting, diarrhea,* hepatotoxicity, abdominal pain, stomatitis, heartburn, dyspepsia, flatulence, melena, cholestatic jaundice, pseudomembranous colitis, tongue discoloration
GU: Vaginitis, moniliasis, nephritis
HEMA: Anemia
INTEG: Rash, urticaria, pruritus, photosensitivity
SYST: Angioedema, Stevens-Johnson syndrome, toxic epidermal necrolysis

PHARMACOKINETICS

PO: Peak 2-4 hr, duration 24 hr
IV: Peak end of inf; duration 24 hr; half-life 11-57 hr; excreted in bile, feces, urine primarily as unchanged product; may be inhibitor of P-glycoprotein

INTERACTIONS

Increase: ergot toxicity—ergotamine
⚠ **Increase:** Dysrhythmias—pimozide: fatal reaction, do not use concurrently
Increase: effects of oral anticoagulants, digoxin, theophylline, methylPREDNISolone, cycloSPORINE, bromocriptine, disopyramide, triazolam, carBAMazepine, phenytoin, tacrolimus, nelfinavir
Decrease: clearance of triazolam
Decrease: absorption of azithromycin—aluminum, magnesium antacids, separate by ≥2 hr

Drug/Lab Test
Increase: CPK, ALT, AST, bilirubin, BUN, creatinine, alk phos

Drug/Food
Decrease: absorption—food (susp)

NURSING CONSIDERATIONS

Assess:
• I&O ratio; report hematuria, oliguria with renal disease
• Hepatic studies: AST, ALT, CBC with differential
• Renal studies: urinalysis, protein, blood
• C&S before product therapy; product may be taken as soon as culture is taken; C&S may be repeated after treatment
• **Serious skin reactions:** Stevens-Johnson syndrome, toxic epidermal necrolysis, angioedema; discontinue if rash develops, treat symptomatically
• **Superinfection:** sore throat, mouth, tongue; fever, fatigue, diarrhea, anogenital pruritus
• **Pseudomembranous colitis:** diarrhea, abdominal pain, fever, fatigue, anorexia; obtain CBC, serum albumin
• Bowel pattern before, during treatment
• Respiratory status: rate, character; wheezing, tightness in chest: discontinue product
• Cardiovascular death has occurred in those with serious bradycardia or ongoing hypokalemia, hypomagnesemia, avoid use

Perform/provide:
• Storage at room temperature

Evaluate:
• Therapeutic response: C&S negative for infection; decreased signs of infection

Teach patient/family:
⚠ To report sore throat, fever, fatigue, severe diarrhea, anal/genital itching (may indicate superinfection)
• Not to take aluminum-magnesium–containing antacids simultaneously with this product (PO)
⚠ To notify nurse of diarrhea, dark urine, pale stools; yellow discoloration of eyes, skin; severe abdominal pain
• To complete dosage regimen
• To take ZMAX 1 hr before or 2 hr after a meal; shake well before use
• To use protective clothing or stay out of the sun, photosensitivity may occur

TREATMENT OF HYPERSENSITIVITY: Withdraw product, maintain airway; administer EPINEPHrine, aminophylline, O_2, IV corticosteroids

azithromycin ophthalmic
See Appendix B

RARELY USED

aztreonam (Rx)

(az-tree'oh-nam)

Azactam, Cayston

Func. class.: Antibiotic—miscellaneous

USES: Urinary tract infection; septicemia; skin, muscle, bone infection; lower respiratory tract, intraabdominal infections; other infections caused by gram-negative organisms

CONTRAINDICATIONS: Hypersensitivity to product, penicillins, cephalosporins, severe renal disease

DOSAGE AND ROUTES

Urinary tract infections

- **Adult: IM/IV** 500 mg-1 g q8-12hr

Systemic infections

- **Adult: IM/IV** 1-2 g q8-12hr
- **Child: IM/IV** 90-120 mg/kg/day in divided doses q6-8hr; max 8 g/day **IV**

Severe systemic infections

- **Adult: IM/IV** 2 g q6-8hr; max 8 g/day; continue treatment for 48 hr after negative culture or until patient is asymptomatic

Cystic fibrosis with *Pseudomonas aeruginosa*

- **Adult, adolescent, child ≥7 yr: NEB** 75 mg tid × 28 days, then 28 days off; give q4hr or more; give bronchodilator before aztreonam

baclofen (Rx)

(bak'loe-fen)

Gablofen, Lioresal

Func. class.: Skeletal muscle relaxant, central acting

Chem. class.: GABA chlorophenyl derivative

Do not confuse:

Lioresal/Lotensin

ACTION: Inhibits synaptic responses in CNS by stimulating GABAb receptor subtype, which decreases neurotransmitter function; decreases frequency, severity of muscle spasms

USES: Spasticity with spinal cord injury, multiple sclerosis

Unlabeled uses: Neuropathic pain, hiccups, trigeminal neuralgia/nystagmus, recurrent priapism

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (C), breastfeeding, geriatric patients, peptic ulcer disease, renal/hepatic disease, stroke, seizure disorder, diabetes mellitus

Black Box Warning: Abrupt discontinuation

DOSAGE AND ROUTES

- **Adult: PO** 5 mg tid × 3 days, then 10 mg tid × 3 days, then 15 mg tid × 3 days, then 20 mg tid × 3 days, then titrated to response, max 80 mg/day; **INTRATHECAL** use implantable intrathecal inf pump, use screening trial of 3 separate bol doses if needed 24 hr apart (50 mcg, 75 mcg, 100 mcg); patients who do not respond to 100 mcg should not be considered for chronic IT therapy; initial: double screening dose that produced result, give over 24 hr, increase by 10%-30% q24hr only; maintenance: 1200-1500 mcg/day
- **Child >2-7 yr: PO** 10-15 mg/day divided q8hr; titrate q3days by 5-15 mg/day to max 40 mg/day
- **Child ≥8 yr:** As above; max 60 mg/day
- **Child: INTRATHECAL** initial test dose same as adult; for small children, initial dose of 25 mcg/dose may be used; 25-1200 mcg/day inf titrated to response in screening phase
- **Geriatric: PO** 5 mg bid-tid

Neuropathic pain including trigeminal neuralgia (unlabeled)

- **Adult: PO** 10 mg tid, may increase by 10 mg every other day; max 80 mg/day

Hiccups (unlabeled)
• **Adult: PO** 10 mg qid
Stuttering/recurrent priapism (unlabeled)
• **Adult: PO** 40 mg at bedtime
Available forms: Tabs 10, 20 mg; IT inj 10 mg/20 ml (500 mcg/ml), 10 mg/5 ml (2000 mcg/ml); pharmacy can prepare extemperaneous liquid preparations
Administer:
PO route
• With meals for GI symptoms
IT route
• **For screening,** dilute to a concentration of 50 mcg/ml with NaCl for inj (preservative free), give test dose over 1 min; watch for decreasing muscle tone, frequency of spasm; if inadequate, use 2 more test doses q24hr; **maintenance inf** via implantable pump of 500-2000 mcg/ml because individual titration is required
• Do not give IT dose by inj, IV, IM, SUBCUT, epidural

Additive compatibilities: CloNIDine, morphine, ziconotide

SIDE EFFECTS

CNS: *Dizziness, weakness, fatigue, drowsiness,* headache, *disorientation,* insomnia, paresthesias, tremors; seizures, life-threatening CNS depression, coma; CNS infection (IT)
CV: Hypotension, chest pain, palpitations, edema; cardiovascular collapse (IT)
EENT: Nasal congestion, blurred vision, mydriasis, tinnitus
GI: *Nausea,* constipation, *vomiting,* increased AST, alk phos, abdominal pain, dry mouth, anorexia
GU: Urinary frequency, hematuria
INTEG: Rash, pruritus
RESP: Dyspnea; respiratory failure (IT)

PHARMACOKINETICS

PO: Onset 3-4 days, peak 2-3 hr, duration >8 hr, half-life 2½-4 hr, partially metabolized in liver, excreted in urine (unchanged)
INTRATHECAL: CSF levels with plasma levels 100 times that of the oral route, peak 4 hr, duration 4-8 hr
BOLUS: Onset ½-1 hr
CONT INF: Onset 6-8 hr, peak 24-48 hr

INTERACTIONS

Increase: CNS depression—alcohol, tricyclics, opiates, barbiturates, sedatives, hypnotics, MAOIs
Increase: hypotension—antihypertensives
Drug/Herb
Increase: CNS depression—kava, valerian
Drug/Lab Test
Increase: AST, alk phos, blood glucose

NURSING CONSIDERATIONS

Assess:
• **Multiple sclerosis:** spasms, spasticity, ataxia; improvement should occur with product
• B/P, weight, blood glucose, hepatic function periodically
⚠ **Seizures:** for increased seizure activity with seizure disorders; product decreases seizure threshold; EEG in epileptic patients
• I&O ratio; check for urinary frequency
• Allergic reactions: rash, fever, respiratory distress
• Severe weakness, numbness in extremities
• Tolerance: increased need for medication, more frequent requests for medication, increased pain
• **Withdrawal symptoms:** CNS depression, dizziness, drowsiness, psychiatric symptoms
• **Intrathecal:** have emergency equipment nearby; assess test dose and titration; if no response, check pump, catheter for proper functioning
Perform/provide:
• Storage in tight container at room temperature
• Assistance with ambulation if dizziness, drowsiness occurs

Evaluate:
- Therapeutic response: decreased pain, spasticity

Teach patient/family:
- Not to discontinue medication quickly; hallucinations, spasticity, tachycardia will occur; product should be tapered off over 1-2 wk
- Not to take with alcohol, other CNS depressants
- To avoid hazardous activities if drowsiness, dizziness occurs; to rise slowly to prevent orthostatic hypotension
- To avoid using OTC medications; not to take cough preparations, antihistamines unless directed by prescriber
- To notify prescriber if nausea; headache; tinnitus; insomnia; confusion; constipation; inadequate, painful urination continues
- **MS:** may require 1-2 mo for full response

TREATMENT OF OVERDOSE:
Induce emesis in conscious patient, activated charcoal, dialysis, physostigmine to reduce life-threatening CNS side effects

⚠ HIGH ALERT

basiliximab (Rx)
(bas-ih-liks'ih-mab)

Simulect

Func. class.: Immunosuppressant

Chem. class.: Murine/human monoclonal antibody (interleukin-2) receptor antagonist

ACTION:
Binds to and blocks the IL-2 receptor, which is selectively expressed on the surface of activated T lymphocytes; impairs the immune system to antigenic challenges

USES:
Acute allograft rejection in renal transplant patients when used with cycloSPORINE and corticosteroids

Unlabeled uses: Liver transplant rejection prophylaxis, graft-versus-host disease

B

CONTRAINDICATIONS:
Breastfeeding, hypersensitivity to mannitol/murine, exposure to viral infections

Precautions: Pregnancy (B), children, geriatric patients, human anti-murine antibody

Black Box Warning: Infections

DOSAGE AND ROUTES
- **Adult/child ≥35 kg: IV** 20 mg × 2 doses; 1st dose within 2 hr before transplant surgery; 2nd dose 4 days after transplantation
- **Child/adolescent <35 kg: IV** 10 mg × 2 doses; 1st dose within 2 hr before transplant surgery; 2nd dose 4 days after transplantation

Available forms: Powder for inj 10, 20 mg

Administer:

Intermittent IV INF route
- **Reconstitute** 10 mg vial/2.5 ml or 20-mg vial in 5 ml sterile water for inj; shake gently to dissolve, **dilute** reconstituted sol in 25 ml (10 mg vial) or 50 ml (20-mg vial) with 0.9% NaCl or D_5, gently invert bag, do not shake; **give** over ½ hr, do not admix

SIDE EFFECTS
CNS: *Pyrexia, chills, tremors, headache, insomnia, weakness, dizziness*

CV: *Chest pain,* angina, cardiac failure, hypotension, *hypertension, edema*

GI: *Vomiting, nausea, diarrhea, constipation, abdominal pain,* GI bleeding, *gingival hyperplasia, stomatitis*

INTEG: *Acne,* pruritus, impaired wound healing

META: *Acidosis, hypercholesterolemia, hyperuricemia, hypo/hyperkalemia, hypocalcemia, hypophosphatemia*

MISC: *Infection, moniliasis,* anaphylaxis, anemia, allergic reaction, dysuria, CMV infection, candidiasis

MS: *Arthralgia, myalgia*

RESP: *Dyspnea, wheezing,* pulmonary edema, *cough*

PHARMACOKINETICS

Peak ½ hr (adults); terminal half-life 7 days (adult), 9½ days (children)

INTERACTIONS

Increase: immunosuppression—other immunosuppressants

Drug/Herb

Decrease: St. John's wort, turmeric

Drug/Lab Test

Increase: cholesterol, BUN, uric acid, creatinine, K, Ca, blood glucose, Hgb, Hct

Decrease: Hgb, Hct, platelets, magnesium, phosphate

NURSING CONSIDERATIONS

Assess:

Black Box Warning: For infection: increased temp, WBC, sputum, urine; may be fatal (bacterial, protozoal, fungal)

- Blood studies: Hgb, WBC, platelets during treatment monthly; if leukocytes are $<3000/mm^3$, product should be discontinued; electrolytes, B/P, edema assessment
- Hepatic studies: alk phos, AST, ALT, bilirubin

Anaphylaxis, hypersensitivity: dyspnea, wheezing, rash, pruritus, hypotension, tachycardia; if severe hypersensitivity reactions occur, product should not be used again

Perform/provide:

- Storage of reconstituted sol refrigerated for up to 24 hr or at room temp for 4 hr

Evaluate:

- Therapeutic response: absence of graft rejection

Teach patient/family:

Black Box Warning: To report fever, chills, sore throat, fatigue, serious infection may occur

- To avoid crowds, persons with known upper respiratory tract infections
- To use contraception during treatment
- To report GI symptoms, bleeding, allergic reactions

beclomethasone (Rx)

(be-kloe-meth'a-sone)

QVAR

Func. class.: Corticosteroid, synthetic

Chem. class.: Glucocorticoid

Do not confuse:

beclomethasone/betamethasone

ACTION: Prevents inflammation by suppression of the migration of polymorphonuclear leukocytes, fibroblasts and the reversal of increased capillary permeability and lysosomal stabilization; does not suppress hypothalamus and pituitary function

USES: Chronic asthma, allergic/vasomotor rhinitis, nasal polyps

CONTRAINDICATIONS: Hypersensitivity, status asthmaticus (primary treatment)

Precautions: Pregnancy (C), breastfeeding, children <12 yr, nasal disease/surgery, nonasthmatic bronchial disease; bacterial, fungal, viral infections of mouth, throat, lungs; HPA suppression, osteoporosis, Cushing's syndrome, diabetes mellitus, measles, cataracts, corticosteroid hypersensitivity, glaucoma, herpes infection

DOSAGE AND ROUTES

- **Adult and child >12 yr: ORAL INH** 40-80 mcg bid (alone) or 40-160 mcg bid (previous inhaled corticosteroids); max 320 mcg bid
- **Child 5-11 yr: ORAL INH** 40 mcg bid; max 80 mcg bid

Available forms: Oral inh 40, 80, 250 ♣mcg/metered spray

Administer:

- Bronchodilator spray; if used, should be used 1st, then wait a few minutes, then use beclomethasone

• Prime before 1st use or if not used for 7-10 days; prime by spraying 2 actuations into the air, away from the face; do not share inhaler
• **Oral inhalation** (metered-dose non-CFC aerosol) (QVAR); shake well, use spacer; after using, rinse mouth, gargle if possible; clean weekly with dry cloth/tissue, do not wash inhaler
• Titrated dose, use lowest effective dose

SIDE EFFECTS

CNS: *Headache*
EENT: *Hoarseness, candidal infection of oral cavity, sore throat,* loss of taste/smell, dysgeusia
ENDO: HPA suppression
GI: Dry mouth, dyspepsia
MISC: Angioedema, adrenal insufficiency, facial edema, Churg-Strauss syndrome (rare)
RESP: Bronchospasm, wheezing, cough

PHARMACOKINETICS

INH: Onset 1-4 wk; excreted in feces, urine (metabolites); half-life 2.8 hr; crosses placenta; metabolized in lungs, liver (by CYP3A)

NURSING CONSIDERATIONS

Assess:
• For fungal infection in mucous membranes
• Adrenal function periodically for HPA axis suppression during prolonged therapy, monitor growth/development
Perform/provide:
• Gum, rinsing of mouth for dry mouth
Evaluate:
• Therapeutic response: decreased dyspnea, wheezing, dry crackles
Teach patient/family:
• To gargle/rinse mouth after each use to prevent oral fungal infections
• That during times of stress, systemic corticosteroids may be needed to prevent adrenal insufficiency; not to discontinue oral product abruptly, to taper slowly
• To notify prescriber if therapeutic response decreases; dosage adjustment may be needed
• Proper administration technique and cleaning technique
• About all aspects of product usage, including cushingoid symptoms
• About **adrenal insufficiency symptoms:** nausea, anorexia, fatigue, dizziness, dyspnea, weakness, joint pain, depression

beclomethasone (nasal)

(be-kloe-meth'a-sone)
Beconase AQ, Qnasal
Func. class.: Nasal corticosteroid

ACTION: Readily crosses cell membranes and binds with high affinity to specific cytoplasmic receptors; inhibition of leukocyte infiltration at the site of inflammation, interference in the function of mediators of inflammatory response, and suppression of humoral immune responses

USES: To relieve symptoms of seasonal/perennial rhinitis

CONTRAINDICATIONS: Hypersensitivity
Precautions: Child <6 yr, untreated fungal infections, glaucoma and/or cataracts, nasal septum ulcers/surgery/trauma

DOSAGE AND ROUTES

• **Adult/child ≥12 yr:** Nasal 1-2 sprays in each nostril bid (42 mcg/spray); 2 sprays in each nostril every day (80 mcg/actuation)
• **Child 6-12 yr:** Nasal 1 spray in each nostril bid
Available forms: nasal spray 42 mcg/metered spray; nasal aerosol 80 mcg/actuation

Administer

- Products are not always interchangeable owing to differences in route of administration and in the amount of active drug released per spray
- To avoid the spread of infection, do not use the container for more than one person
- Product's effectiveness depends on regular use

Nasal inhalation (metered-dose aerosol) (Qnasal):

- Instruct patient to shake the canister well before administering
- Before first use, instruct the patient to prime the pump by actuating 4 times. After the initial priming, the dose-counter should read 120
- If the canister is not used for 7 consecutive days, instruct the patient to prime by actuating 2 times
- Instruct patient on proper administration technique

Nasal inhalation (pump spray) (Beconase AQ):

- Instruct patient to shake the nasal sprayer well before use
- Before first use, instruct the patient to prime the pump by actuating 6 times
- If the pump is not used for 7 days, prime until a fine spray appears
- Instruct patient on proper administration technique
- After use, rinse the tip of the bottle with hot water, taking care not to suck water into the bottle, and dry with a clean tissue; replace the cap

SIDE EFFECTS

CNS: Headache, dizziness
EENT: Nasal burning, epistaxis, nasal fungal infections, nasal congestion, sneezing
GI: Nausea

PHARMACOKINETICS

Onset 7 days, peak 21 days, half-life 15 hr

NURSING CONSIDERATIONS

Assess:

- Nasal symptoms: Assess for sneezing, running of nose before and after use, avoid use longer than 3 wk, check for fungal infections, changes in vision

Evaluate:

- Decrease nasal running, sneezing, other symptoms of seasonal/perennial rhinitis

Teach patient/family:

- That products are not always interchangeable owing to differences in route of administration and in the amount of active drug released per spray
- To avoid the spread of infection, do not use the container for more than one person
- That product effectiveness depends on regular use

Nasal inhalation (metered-dose aerosol) (Qnasal):

- Instruct patient to shake the canister well before administering
- Before first use, instruct the patient to prime the pump by actuating 4 times. After the initial priming, the dose-counter should read 120
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- If the pump is not used for 7 days, prime until a fine spray appears
- Instruct patient on proper administration technique
- After use, rinse the tip of the bottle with hot water, taking care not to suck water into the bottle, and dry with a clean tissue; replace the cap

belatacept

(bel-a-ta'sept)

Nulojix

Func. class.: Biologic response modifier

Chem. class.: Fusion protein

ACTION: Activated T lymphocytes are the mediators of immunologic rejection, this product is a selective T-cell costimulation blocker; blocks the CD28 mediated costimulation of T lymphocytes by binding to CD80 and CD86 on antigen-presenting cells; inhibits T lymphocyte proliferation and the production of the cytokines interleukin-2, interferon-gamma, interleukin-4, and TNF-alpha.

USES: Kidney transplant rejection prophylaxis given with basiliximab induction, mycophenolate mofetil, corticosteroids

CONTRAINDICATIONS: Hypersensitivity

Precautions: Breastfeeding, child/infant/neonate, pregnancy (C), diabetes mellitus, progressive multifocal leukoencephalopathy, immunosuppression, sunlight exposure, TB

Black Box Warning: Infection, organ transplant, requires an experienced clinician, secondary malignancy, posttransplant lymphoproliferation disorder

DOSAGE AND ROUTES

• **Adult: IV** 10 mg/kg rounded to the nearest 12.5 mg increment; give over 30 min the day of transplantation (day 1) but before transplantation, on day 5 approximately 96 hours after the day 1 dose 1, at the end of wk 2, at the end of wk 4, at the end of wk 8, and at the end of wk 12; maintenance dosage is 5 mg/kg rounded to the nearest 12.5 mg increment; give over 30 min at the end of wk 16 and every 4 wk ± 3 days thereafter; doses should be calculated on actual body weight on the transplantation day unless the patient's weight varies by >10%

Available forms: Powder for inj 250 mg

Administer:

Black Box Warning: Only providers skilled in the use of immunosuppressant and management of transplant should use these products

IV route

• Visually inspect product for particulate matter, discoloration whenever sol/container permit, discard if present

• Calculate the number of drug vials required to provide total inf dose

• Reconstitute each vial/10.5 ml of sterile water for injection, 0.9% sodium chloride, D_5W, using the silicone-free disposable syringe provided with each vial and an 18-21G needle. If silicone-free disposable syringe is dropped or becomes contaminated, use a new silicone-free disposable syringe from inventory. If you need additional silicone-free disposable syringes, call 1-888-685-6549. If the powder is accidentally reconstituted using a different syringe than the one provided, the sol may develop a few translucent particles. Discard any sol prepared using siliconized syringes.

• Using aseptic technique, inject the diluent into the vial and direct the stream of diluent to the glass wall of the vial; to minimize foaming, rotate the vial and invert with gentle swirling until the contents are dissolved; do not shake when reconstituted (25 mg/ml), should be clear to slightly opalescent and colorless to pale yellow; do not use if opaque particles, discoloration, or other foreign particles are present.

• Calculate the total volume of the reconstituted 25 mg/ml sol required to provide the total inf dose; further dilute this volume with a volume of inf fluid equal to

the volume of the reconstituted drug sol required to provide the prescribed dose. Use either NS or D_5W if drug was reconstituted with SWFI; use NS if drug was reconstituted with NS; use D_5W if drug was reconstituted with D_5W. With the same silicone-free disposable syringe used for reconstitution, withdraw the required amount of belatacept sol from the vial, inject it into the inf container, gently rotate the inf container to ensure mixing; final conc in inf container should range (2-10 mg/ml). Volume of 100 ml will be appropriate for most patients and doses, but total inf volumes ranging from 50-250 ml may be used. Discard any unused drug sol remaining in the vials; after reconstitution, immediately transfer the reconstituted sol from the vial to the inf bag or bottle; complete within 24 hr.

IV INF route

- Give over 30 min, use an inf set and a sterile, nonpyrogenic, low-protein-binding filter (0.2-1.2 mm), use a separate line

SIDE EFFECTS

CNS: Guillain-Barré syndrome, anxiety, dizziness, headache, fever, insomnia, tremor

EENT: Pharyngitis, stomatitis

GI: Abdominal pain, constipation, diarrhea, nausea, vomiting

GU: Renal tubular necrosis, renal failure, proteinuria, urinary incontinence

HEMA: Anemia, neutropenia, leucopenia, leukoencephalopathy

INTEG: Acne, alopecia

META: Hypercholesterolemia, hyperglycemia, hyper/hypokalemia, hypocalcemia, hypophosphatemia, hypomagnesemia

MS: Arthralgia

SYST: Secondary malignancy, posttransplant lymphoproliferation disorder, wound dehiscence, BK-virus-associated neuropathy

PHARMACOKINETICS

Half-life, 6.1-15.1 days during receipt of 10 mg/kg IV doses; during receipt of 5 mg/kg IV doses, terminal half-life 3.1-11.9; steady-state by wk 8 after transplantation and by month 6 during maintenance phase

INTERACTIONS

Increase: Basiliximab induction, mycophenolate mofetil

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Transplant rejection: flulike symptoms, decreasing urinary output, malaise; some may experience pain in area (rare; monitor BUN/creatinine)

Black Box Warning: Infection: monitor for fever, chills, increased WBC, **wound dehiscences**

Black Box Warning: Posttransplant lymphoproliferation disorder: may lead to secondary malignancy (lymphoma) or infectious mononucleosis-like lesions; may be treated with antivirals or immunosuppressant; product may need to be discontinued

- Hyperlipidemia: monitor cholesterol, triglycerides; an antilipidemic may be needed

Perform/provide:

- Storage: refrigerated, protected from light ≤24 hr; max 4 hr of the total 24 hr can be at room temp and room light

Evaluate:

- Therapeutic response: absence of renal transplant rejection

Teach patient/family:

- Reason for product and expected result
- To avoid exposure to sunlight, tanning beds, risk of secondary malignancy
- To avoid crowds, persons with known infections
- That repeated lab test will be needed
- To avoid with vaccines
- That immunosuppressants will be needed for life to prevent rejection; teach symptoms of rejection and to call provider immediately

belimumab

(be-lim'ue-mab)

Benlysta

Func. class.: Monoclonal antibody

Chem. class.: Disease-Modifying Antirheumatic Drugs (DMARDs)

ACTION: Inhibits B lymphocyte stimulator (BLyS), needed for B-cell survival; normally, soluble BLyS binds to its receptors on B cells and allows B-cell survival; binds BLyS and prevents binding to its receptors on B-cells

USES: Active, autoantibody-positive, systemic lupus erythematosus (SLE) in combination with standard therapy

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (C), breastfeeding, children/infants, geriatric patients, African decent patients, depression, immunosuppression, infection, suicidal ideation, vaccination, secondary malignancy, cardiac disease; requires experienced clinician

DOSAGE AND ROUTES

• **Adult: IV** 10 mg/kg over 1 hr q2wk for the first 3 doses then q4wk

Available forms: Powder for injection 120, 400 mg

Administer:

• Only health care providers prepared to manage anaphylaxis should administer this product; may give premedication for prophylaxis against infusion and hypersensitivity reactions

Intermittent IV INF route

• Visually inspect particulate matter and discoloration whenever sol and container permits

• Give as IV inf only, do not give IV bolus or push; give over 1 hr and slow or stop if inf reactions occur

• Do not give with any other agents in the same IV line

• Allow to stand at room temp for 10-15 min before using

• Reconstitute with the appropriate amount of sterile water for injection (80 mg/ml); add 1.5 ml of sterile water (120 mg/vial) or 4.8 ml of sterile water (400 mg/vial)

• Direct the stream of sterile water toward the side of the vial to minimize foaming; gently swirl for 60 sec, allow to sit during reconstitution, gently swirl for 60 sec q5min until the powder is dissolved; do not shake; reconstitution is complete in 10 to 30 min

• If a mechanical reconstitution device (swirler) is used, max 500 rpm swirled for ≤30 min.

• Sol should be opalescent and colorless to pale yellow and without particles; small air bubbles are expected; protect from sunlight

• Dilution: only dilute in normal saline for injection; dilute reconstituted sol with enough normal saline to 250 ml. From a 250-ml inf bag or bottle of normal saline, withdraw and discard a volume equal to the volume of the reconstituted sol required for dose; add the required volume of the reconstituted sol the infusion bag/bottle; gently invert to mix

• Discard any unused sol

SIDE EFFECTS

CNS: Headache, dizziness, anxiety, depression, fever, insomnia, migraine, **suicidal ideation**

CV: Bradycardia, hypotension

GI: Nausea, diarrhea

MISC: Rash, dyspnea, cystitis, leukopenia, myalgia, rash, bronchitis, nasopharyngitis, pharyngitis

SYST: **Anaphylaxis, angioedema, antibody formation, secondary malignancy, infection, influenza**

PHARMACOKINETICS

Terminal half-life 19.4 days; distribution half-life 1.75 days

NURSING CONSIDERATIONS

Assess:

- **SLE:** monitor for decreasing fever, malaise, fatigue, joint pain, myalgias
- **Suicidal ideation:** more common in those with preexisting depression
- **Infection:** determine if a chronic or acute infection is present, may be fatal when used with this product; do not begin therapy if any products are being used for a chronic infection; leucopenia may occur with this product and susceptibility to infections increased
- **Anaphylaxis,** infusion site reactions: if these occur, stop infusion
- **African descent patients:** use cautiously in these patients, may not respond to this product
- Cardiac disease: monitor closely for cardiovascular side effects, bradycardia, hypotension
- Pregnancy: determine if pregnant or if pregnancy is planned or suspected; if pregnant, call 1-877-681-6269 to enroll in registry

Perform/provide:

- Storage in refrigerator or at room temp; total time from reconstitution to completion of inf max 8 hr

Evaluate:

- Positive response: Decreasing symptoms of SLE: decreasing fatigue, fever, malaise

Teach patient/family:

- To notify prescriber if pregnancy is planned or suspected, to use reliable contraception during and for 4 months after final treatment; to avoid breastfeeding
- To seek treatment immediately for serious hypersensitive reactions
- Not to receive vaccinations during treatment

benazepril (Rx)

(ben-aze'uh-pril)

Lotensin

Func. class.: Antihypertensive

Chem. class.: Angiotensin-converting enzyme (ACE) inhibitor

Do not confuse:
benazepril/Benadryl

ACTION: Selectively suppresses renin-angiotensin-aldosterone system; inhibits ACE, thus preventing conversion of angiotensin I to angiotensin II

USES: Hypertension, alone or in combination with thiazide diuretics

Unlabeled uses: CHF, diabetic nephropathy, proteinuria, renal impairment

CONTRAINDICATIONS: Breastfeeding, children, hypersensitivity to ACE inhibitors, angioedema

Black Box Warning: Pregnancy (D)

Precautions: Geriatric patients, impaired renal/hepatic function, dialysis patients, hypovolemia, blood dyscrasias, CHF, COPD, asthma, bilateral renal artery stenosis

DOSAGE AND ROUTES

- **Adult: PO** 10 mg/day initially, then 20-40 mg/day divided bid or daily (without a diuretic); reduce initial dose to 5 mg **PO** daily (with a diuretic); max 80 mg/day
- **Geriatric: PO** used on the basis of the clinical response
- **Child ≥6 yrs: PO** 0.2 mg/kg/day max 5 mg/day

Renal dose

- **Adult: PO** CCr <30 ml/min 5 mg **PO** daily, max 40 mg/day

Renal impairment due to diabetic nephropathy (unlabeled)

- **Adult: PO** 10 mg/day

Heart failure (unlabeled)

- **Adult: PO** 2-20 mg/day

Available forms: Tabs 5, 10, 20, 40 mg

Administer:
- May give without regard to food
- Do not discontinue product abruptly

SIDE EFFECTS

CNS: Anxiety, hypertonia, insomnia, paresthesia, headache, dizziness, fatigue
CV: Hypotension, postural hypotension, syncope, palpitations, angina
GI: Nausea, constipation, vomiting, gastritis, melena, diarrhea
GU: Increased BUN, creatinine, decreased libido, impotence, UTI
HEMA: Agranulocytosis, neutropenia
INTEG: Rash, flushing, sweating
META: Hyperkalemia, hyponatremia
MISC: Angioedema
MS: Arthralgia, arthritis, myalgia
RESP: Cough, asthma, bronchitis, dyspnea, sinusitis

PHARMACOKINETICS

Peak 1-2 hr fasting, 2-4 hr after food; protein binding 89%-95%; half-life 10-11 hr; metabolized by liver (metabolites); excreted in urine 33%

INTERACTIONS

Increase: hypotension—phenothiazines, nitrates, acute alcohol ingestion, diuretics, other antihypertensives
Increase: hyperkalemia—potassium-sparing diuretics, potassium supplements
Increase: myelosuppression—azaTHIOprine
Increase: serum levels of lithium, digoxin
Decrease: hypotensive effects—NSAIDs

Drug/Herb
Increase: antihypertensive effect—hawthorn
Decrease: antihypertensive effect—ephedra (Ma huang)

Drug/Lab Test
Increase: AST, ALT, alk phos, bilirubin, uric acid, blood glucose
Positive: ANA titer
False positive: ANA titer

NURSING CONSIDERATIONS

Assess:
- **Hypertension:** B/P, pulse at baseline, periodically; orthostatic hypotension, syncope when used with diuretic; notify prescriber of changes; monitor compliance
- **Blood dyscrasias:** neutrophils, decreased platelets; WBC with differential at baseline, q3mo; if neutrophils $<1000/mm^3$, discontinue treatment; recommended with **collagen-vascular disease**
- Renal studies: protein, BUN, creatinine; increased levels may indicate nephrotic syndrome; monitor urine for protein; LFTs, uric acid, glucose may be increased; diuretic should be discontinued 3 days before initiation of benazepril, if hypertension is not controlled, a diuretic can be added; measure B/P at peak 2-4 hr and trough (before next dose); this product is less effective in African descent patients
- Potassium levels, although hyperkalemia rarely occurs
- **Allergic reactions:** rash, fever, pruritus, urticaria; product should be discontinued if antihistamines fail to help; angioedema is more common in patients of African descent
- Renal symptoms: polyuria, oliguria, frequency, dysuria
- **CHF (unlabeled):** edema in feet, legs daily; weight daily

Perform/provide:
- Storage in tight container at 86° F (30° C) or less

Evaluate:
- Therapeutic response: decrease in B/P

Teach patient/family:
- Not to use OTC products (cough, cold, allergy) unless directed by prescriber; not to use salt substitutes that contain potassium without consulting prescriber
- The importance of complying with dosage schedule, even if feeling better

Black Box Warning: To notify prescriber of pregnancy (D); product will need to be discontinued

- To rise slowly to sitting or standing position to minimize orthostatic hypotension
- To notify prescriber of mouth sores, sore throat, fever, swelling of hands or feet, irregular heartbeat, chest pain, bruising, bleeding, swelling of face, tongue, lips, difficulty breathing
- To report excessive perspiration, dehydration, vomiting, diarrhea; may lead to fall in B/P; to use caution in hot weather
- That product may cause dizziness, fainting, lightheadedness; that this may occur during first few days of therapy
- That product may cause skin rash or impaired perspiration
- How to take B/P, and normal readings for age-group
- To avoid potassium-containing products (salt substitutes)

TREATMENT OF OVERDOSE:
0.9% NaCl IV INF, hemodialysis

⚠ HIGH ALERT

bendamustine (Rx)
(ben-da-muss'teen)

Treanda

Func. class.: Antineoplastic alkylating agent

Chem. class.: Mechlorethamine derivative

ACTION: Cross-linking DNA that causes single strand and double strand breaks, inhibits several mitotic checkpoints, combines alkylating and antimetabolite properties

USES: Chronic lymphocytic leukemia, non-Hodgkin's lymphoma
Unlabeled uses: Mantle cell lymphoma (MCL)

CONTRAINDICATIONS: Pregnancy (D), fetal harm may occur; breastfeeding, children, hepatic disease, renal impairment, hypersensitivity to product or mannitol
Precautions: Hyperuricemia, infusion-related reactions, myelosuppression, infection, skin reactions

DOSAGE AND ROUTES
Chronic lymphocytic leukemia
- **Adult: IV INF** 100 mg/m^2 over 30 min on days 1, 2 q28days up to 6 cycles

Non-Hodgkin's lymphoma
- **Adult: IV INF** 120 mg/m^2 over 60 min on days 1, 2 q21days up to 8 cycles

Mantle cell lymphoma (unlabeled)
- **Adult: IV INF** 90 mg/m^2 on days 1, 2 with rituximab on day 1 q28days for 6 cycles

Renal/hepatic dose
- **Adult: IV INF** CCr <40 ml/min, do not use; AST or ALT 2.5-10 × upper limit normal or bilirubin 1.5-3 × ULN, do not use

Available forms: Powder for inj 25, 100 mg

Administer:
- Allopurinol for 1-2 wk to those at high risk for tumor lysis syndrome, usually develops in first treatment cycle
- Blood transfusions, RBC colony-stimulating factors to counter anemia
- Antiemetic 30-60 min before giving product to prevent vomiting
- All medications PO; if possible, avoid IM inj if platelets are <100,000/mm^3

Intermittent IV INF route
- Prepare in biologic cabinet wearing gown, gloves, mask; avoid contact with skin, can cause burning, stain the skin brown; use cytotoxic handling procedures
- After **reconstituting** 100 mg product/20 ml or 25 mg/5 ml sterile water for inj (5 mg/ml), sol should be clear, colorless to pale yellow, completely dissolve in 5 min; if particulate is present, do not use
- Within 30 min of reconstitution, withdraw volume needed and **further dilute** in 500 ml NS or $D_{2.5/0.45}$%NS to a final conc of 0.2-0.6 mg/ml; doses of ≤100 mg/m^2, **give** over 30 min; doses of >100 mg/m^2, **give** over 60 min

• Monitor for inf reactions; may use antihistamines or corticosteroids for grade 1, 2 reactions; if grade 3 or 4 occurs, discontinue if needed

SIDE EFFECTS

CNS: Asthenia, *fatigue*, fever, *headache*, chills, hypertension
CV: Hypertension, hypertensive crisis
GI: *Nausea, vomiting, diarrhea*, hyperbilirubinemia, *constipation*, stomatitis, *anorexia*, weight loss
GU: Renal failure
HEMA: Thrombocytopenia, leukopenia, anemia, lymphocytopenia, neutropenia, secondary malignancy, toxic epidermal necrolysis, tumor lysis syndrome
INTEG: *Bulbous rash, pruritus*, extravasation
META: Hyperuricemia
SYST: Anaphylaxis, infection, dehydration, severe skin toxicities, tumor lysis syndrome, Stevens-Johnson syndrome

PHARMACOKINETICS

95% protein binding, metabolized by hydrolysis via CYP450 1A2, 2 metabolites are produced, half-life 40 min, 90% excreted unchanged (feces)

INTERACTIONS

Increase: agranulocytosis risk—cloZAPine (do not use concurrently)
Increase: bleeding risk—aspirin, anticoagulants, NSAIDs, platelet inhibitors, thrombolytics
Increase: myelosuppression—myelosuppressive agents
Increase: toxicity—other antineoplastics, radiation
Increase: adverse reactions, decreased antibody reaction—live vaccines
Increase: bendamustine—CYP1A2 inhibitors (atazanavir, cimetidine, ciprofloxacin, enoxacin, ethyl estradiol, fluvoxaMINE, mexiletine, norfloxacin, tacrine, thiabendazole, zileuton)
Decrease: bendamustine—CYP1A2 inducers (barbiturates, carBAMazepine, rifampin)

Drug/Lab Test
Increase: LFTs

NURSING CONSIDERATIONS

B

Assess:
• **Blood dyscrasias:** CBC, differential, platelet count weekly; withhold product if WBC is <1000 or if platelet count is <75,000; notify prescriber of results
• Hepatic studies: AST, ALT, bilirubin
• Renal studies: BUN, serum uric acid, urine CCr before, during therapy; I&O ratio; report fall in urine output of 30 or 40 ml/hr; electrolytes
• Monitor for cold, cough, fever (may indicate beginning infection)
• For malignancy regression
• Bleeding: hematuria, guaiac, bruising, petechiae, mucosa, orifices q8hr
• **Serious skin toxicities:** toxic epidermal necrolysis, Stevens-Johnson syndrome; product should be discontinued
• **Tumor lysis syndrome:** monitor uric acid, potassium; may occur during 1st treatment cycle; use allopurinol for patients at high risk for this condition, usually during the 1st 2 wk; provide adequate hydration

Perform/provide:
• Storage of reconstituted sol in refrigerator for 24 hr or at room temp for 3 hr; protect from light; store vials at room temp

Evaluate:
• Therapeutic response: improvement in blood counts, morphology

Teach patient/family:
• To avoid hazardous activity that requires mental alertness
• To avoid crowds, persons with upper respiratory infections
• To report immediately fever, sore throat, flulike symptoms, indicates infection
• To report immediately allergic reaction, facial swelling, difficulty breathing, itchy rash
• Until reaction is known, not to breastfeed, males should also use contraception during and for 3 months after

- To use contraception during therapy and for 3 mo after pregnancy (D)
- To avoid use of aspirin, ibuprofen, razors, commercial mouthwash
- To report signs of anemia (fatigue, irritability, SOB, faintness)
- To report signs of infection, myelosuppression, skin toxicities, diarrhea, nausea, vomiting

benzocaine topical

See Appendix B

RARELY USED

benzonatate (Rx)

(ben-zoe'na-tate)

Tessalon Perles, Zonatuss

Func. class.: Antitussive, nonopioid

USES: Nonproductive cough

CONTRAINDICATIONS: Hypersensitivity

DOSAGE AND ROUTES

- **Adult and child: PO** 100 mg up to tid; max 600 mg/day

benztropine (Rx)

(benz'troe-peen)

Cogentin

Func. class.: Cholinergic blocker, antiparkinson's agent

Chem. class.: Tertiary amine

ACTION: Blockade of central acetylcholine receptors, balances cholinergic activity

USES: Parkinson's symptoms, EPS associated with neuroleptic products, acute dystonic reactions, hypersalivation

CONTRAINDICATIONS: Children <3 yr, hypersensitivity, closed-angle glaucoma, myasthenia gravis, GI/GU obstruction, peptic ulcer, megacolon, prostate hypertrophy, dementia, tardive dyskinesia

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, tachycardia, renal/hepatic disease, substance abuse history, dysrhythmias, hypo/hypertension, psychiatric patients

DOSAGE AND ROUTES

Drug-induced EPS

- **Adult: IM/IV/PO** 1-4 mg daily/bid; give **PO** dose as soon as possible
- **Child >3 yr: IM/IV/PO** 0.02-0.05 mg/kg/dose 1-2×/day

Parkinson's symptoms

- **Adult: PO/IM** 0.5-1 mg at bedtime; increase by 0.5 mg q5-6days titrated to patient response, max 6 mg/day

Acute dystonic reactions

- **Adult: IM/IV** 1-2 mg, may increase to 1-2 mg bid **(PO)**

Available forms: Tabs 0.5, 1, 2 mg; inj 1 mg/ml

Administer:

PO route

- With or after meals to prevent GI upset; may give with fluids other than water
- At bedtime to avoid daytime drowsiness with parkinsonism

IM route

- Inject deeply in muscle, use filtered needle to remove solution from ampule

IV, direct route

- **Undiluted** IV (1 mg 5 1 ml): **give** 1 mg/1 min (rarely used)

Syringe compatibilities: Metoclopramide, perphenazine

Y-site compatibilities: Fluconazole, tacrolimus

SIDE EFFECTS

CNS: Anxiety, restlessness, irritability, delusions, hallucinations, headache, se-

dation, depression, incoherence, dizziness, memory loss; *confusion;* delirium (geriatric patients)
CV: Palpitations, tachycardia, hypotension, bradycardia
EENT: Blurred vision, photophobia, dilated pupils, difficulty swallowing
GI: *Dryness of mouth, constipation,* nausea, vomiting, abdominal distress, paralytic ileus
GU: Urinary hesitancy/retention, dysuria
INTEG: Rash, urticaria, dermatoses
MISC: Increased temperature, flushing, decreased sweating, hyperthermia, heat stroke, numbness of fingers

PHARMACOKINETICS

PO: Onset 1 hr, duration 6-10 hr
IM/IV: Onset 15 min, duration 6-10 hr

INTERACTIONS

Increase: anticholinergic effect—amantadine; antihistamines, phenothiazines, tricyclics, disopyramide, quiNIDine; reduce dose
Decrease: absorption—antidiarrheals, antacids
Decrease: anticholinergic effect of—cholinergic

NURSING CONSIDERATIONS

Assess:
• **Parkinsonism:** EPS, shuffling gait, muscle rigidity, involuntary movements, loss of balance
• Paralytic ileus: abdominal pain, intermittent constipation/diarrhea
• I&O ratio; commonly causes decreased urinary output; urinary hesitancy, retention; palpate bladder if retention occurs
• Constipation: increase fluids, bulk, exercise if this occurs
• Mental status: affect, mood, CNS depression, worsening of mental symptoms during early therapy
• Use caution during hot weather; product may increase susceptibility to heat stroke by decreasing sweating
• With benztropine "buzz" or "high," patients may imitate EPS

Perform/provide:
• Storage at room temp
• Hard candy, gum, frequent drinks to relieve dry mouth

Evaluate:
• Therapeutic response: absence of involuntary movements after 2 days of treatment

Teach patient/family:
• To report urinary hesitancy/retention, dysuria
• That tabs may be crushed, mixed with food, may take whole dose at bedtime if approved by prescriber
• Not to discontinue product abruptly; to taper off over 1 wk or withdrawal symptoms may occur (EPS, tremors, insomnia, tachycardia, restlessness); to take as directed; not to double dose
• To avoid driving, other hazardous activities; drowsiness/dizziness may occur
• To avoid OTC medications: cough, cold preparations with alcohol, antihistamines, antacids, antidiarrheals within 2 hr unless directed by prescriber
• To change positions slowly to prevent orthostatic hypotension
• To use good oral hygiene, frequent sips of water, sugarless gum for dry mouth

bepotastine

(beh-pot'uh-steen)

Bepreve

Func. class.: Antihistamine (ophthalmic)

Chem. class.: Histamine 1 receptor antagonist

ACTION: A topically active, direct H_1-receptor antagonist and mast cell stabilizer; by reducing these inflammatory mediators, relieves the ocular pruritus associated with allergic conjunctivitis

USES: Ocular pruritus associated with signs and symptoms of allergic conjunctivitis

CONTRAINDICATIONS:
Hypersensitivity

Precautions: Pregnancy (C), breastfeeding, children, contact lenses

DOSAGE AND ROUTES

• **Adult/Child ≥2 yrs: OPHTH** Instill 1 drop in each eye bid, max 2 drops/day in each eye

Available forms: Ophthalmic solution 1.5%

Administer

Ophthalmic route

• For topical ophthalmic use only

• Wash hands before and after use. Tilt the head back slightly and pull the lower eyelid down with the index finger. Squeeze the prescribed number of drops into the conjunctival sac and gently close eyes for 1–2 min, do not blink

• Do not touch the tip of the dropper to the eye, fingertips, or other surface

• Wait ≥10 min after instilling the ophthalmic solution before inserting contact lenses; contact lenses should not be worn if eye is red. The preservative in this product may be absorbed by soft contact lenses

• Do not share ophthalmic drops with others

SIDE EFFECTS

CNS: Headache

EENT: Taste change, ocular irritation, pharyngitis

NURSING CONSIDERATIONS

Assess:

• Eyes: for itching, redness, use of soft or hard contact lenses

Evaluate:

• Therapeutic response: absence of redness, itching in the eyes

Teach patient/family:

Ophthalmic route

• Product is for topical ophthalmic use only

• Wash hands before and after use. Tilt the head back slightly and pull the lower eyelid down with the index finger. Squeeze the prescribed number of drops into the conjunctival sac and gently close eyes for 1–2 min, do not blink

• Do not touch the tip of the dropper to the eye, fingertips, or other surface

• Wait ≥10 min after instilling the ophthalmic solution before inserting contact lenses; contact lenses should not be worn if eye is red

• Do not share ophthalmic drops with others

• Remove **contact lenses** before use because the preservative, benzalkonium chloride, may be absorbed by soft contact lenses; product should not be used to treat contact lens–related irritation

RARELY USED

beractant (Rx)

(ber-ak′tant)

Survanta

Func. class.: Natural lung surfactant

USES:
Prevention and treatment (rescue) of respiratory distress syndrome in premature infants

DOSAGE AND ROUTES

• **Newborn: INTRATRACHEAL INSTILL** 4 doses can be administered during the 1st 48 hr of life; give doses no more frequently than q6hr; each dose is 100 mg of phospholipids/kg birth weight

betamethasone (topical)

(bay-ta-meth'a-sone)

betamethasone dipropionate

Diprolene, Diprolene AF

betamethasone augmented dipropionate

betamethasone valerate

Beta-Val, Luxiq

Func. class.: Corticosteroid, topical

ACTION: Crosses cell membrane to attach to receptors to decrease inflammation, itching; inhibits multiple inflammatory cytokines

USES: Inflammation/itching corticosteroid-responsive dermatoses on the skin/scalp

CONTRAINDICATIONS: Hypersensitivity, use of some preparations on face, axilla, groin

Precautions: Pregnancy (C), skin infections

DOSAGE AND ROUTES

• **Adult: TOP** 1-2 times/day (dipropionate) or 1-3 times/day (valerate)

Available forms: dipropionate: gel, lotion, ointment, cream 0.05%; valerate: cream, lotion, ointment 0.1%, foam 0.12%

SIDE EFFECTS

INTEG: Burning, folliculitis, pruritus, dermatitis, maceration, erythema

MISC: Hyperglycemia; glycosuria, Cushing syndrome, HPA axis suppression

PHARMACOKINETICS

Unknown

NURSING CONSIDERATIONS

Assess:

• Skin reactions: burning pruritus, folliculitis, dermatitis

Evaluate:

• Decreased itching, inflammation on the skin, scalp

Teach patient/family:

Topical route

• That betamethasone valerate may be used with occlusive dressings for psoriasis or recalcitrant conditions, do not use dipropionate with occlusive dressings

Cream/ointment/lotion:

• To apply sparingly in a thin film, using gloves, and rub gently into the cleansed, slightly moist affected area

Gel:

• To apply sparingly in a thin film, using gloves, and rub gently into the cleansed, slightly moist affected area

Scalp foam:

• To invert can and dispense a small amount of foam onto a saucer or other cool surface. Do not dispense directly onto hands. Pick up small amounts of foam with fingers and gently massage into affected area until foam disappears. Repeat until entire affected scalp area is treated.

• That treatment should be limited to 2 wk

betamethasone (augmented) topical

See Appendix B

betaxolol (ophthalmic)

(beh-tax'oh-lol)

Betoptic-S

Func. class.: Antiglaucoma

Chem. class.: Beta blocker

ACTION: Can decrease aqueous humor and increase outflows

USES: Treatment of chronic open-angle glaucoma and ocular hypertension

CONTRAINDICATIONS

Hypersensitivity, AV block, heart failure, bradycardia, sick sinus syndrome

Precautions: Abrupt discontinuation, children, pregnancy, breastfeeding, asthma, COPD, depression, diabetes mellitus, myasthenia gravis, hyperthyroidism, pulmonary disease, angle-closure glaucoma

DOSAGE AND ROUTES

• **Adult: IV INF** Instill 1–2 drops in the affected eye(s) bid.

Available forms: Ophthalmic sol 0.5%; ophthalmic susp 0.25%

SIDE EFFECTS

CNS: Insomnia, headache, dizziness
CV: Palpitations
EENT: Eye stinging/burning, tearing, photophobia
MISC: Bronchospasm

PHARMACOKINETICS

Onset 30 min, peak 2 hr, duration ≥12 hr

NURSING CONSIDERATIONS

Assess:

⚠ **Systemic absorption:** When used in the eye, systemic absorption is common, with the same adverse reactions and interactions

• Glaucoma: Monitor intraocular pressure

Evaluate:

• Decreasing intraocular pressure

Teach patient/family:

• That strength is expressed in betaxolol base

• That drug is for ophthalmic use only. Shake the ophthalmic suspension well before use

• Not to touch the tip of the dropper to the eye, fingertips, or other surface to prevent contamination

• To wash hands before and after use. Tilt the head back slightly and pull the lower eyelid down with the index finger to form a pouch. Squeeze the prescribed number of drops into the pouch. Close eyes to spread drops. To avoid excessive systemic absorption, apply finger pressure on the lacrimal sac for 1–2 min following use

• That if more than one topical ophthalmic drug product is being used, the drugs should be administered at least 5 min apart

• To avoid contamination or the spread of infection, do not use dropper for more than one person

bethanechol (Rx)

(be-than'e-kole)

Urecholine

Func. class.: Urinary tract stimulant, cholinergic

Chem. class.: Synthetic choline ester

ACTION: Stimulates muscarinic ACH receptors directly; mimics effects of parasympathetic nervous system stimulation; stimulates gastric motility, micturition; increases lower esophageal sphincter pressure

USES: Urinary retention (postoperative, postpartum), neurogenic atony of bladder with retention

Unlabeled uses: Ileus, GERD, anticholinergic syndrome

CONTRAINDICATIONS

Hypersensitivity, severe bradycardia, asthma, severe hypotension, hyperthyroidism, peptic ulcer, parkinsonism, seizure disorders, CAD, COPD, coronary occlusion, mechanical obstruction, peritonitis, recent urinary/GI surgery, GI/GU obstruction

Precautions: Pregnancy (C), breastfeeding, children <8 yr, hypertension

DOSAGE AND ROUTES

- **Adult: PO** 10-50 mg bid-qid
- **Child (unlabeled): PO** 0.6 mg/kg/day in 3-4 divided doses

Ileus (unlabeled)

- **Adult: PO** 10-20 mg tid-qid before meals

Available forms: Tabs 5, 10, 25, 50 mg

Administer:

- To avoid nausea, vomiting, take on an empty stomach
- Only after all other cholinergics have been discontinued

SIDE EFFECTS

CNS: Dizziness, headache, malaise

CV: Hypotension, bradycardia, reflex tachycardia, cardiac arrest, circulatory collapse

EENT: Miosis, increased salivation, lacrimation, blurred vision

GI: *Nausea, bloody diarrhea, belching, vomiting, cramps, fecal incontinence*

GU: Urgency

INTEG: Rash, urticaria, flushing, increased sweating

RESP: Acute asthma, dyspnea, bronchoconstriction

PHARMACOKINETICS

PO: Onset 30-90 min, duration 6 hr

INTERACTIONS

Increase: severe hypotension—ganglionic blockers

Increase: action or toxicity—cholinergic agonists, anticholinesterase agents

Decrease: action of anticholinergics, procainamide, quiNIDine

Drug/Lab Test

Increase: AST, lipase/amylase, bilirubin

NURSING CONSIDERATIONS

Assess:

- **Urinary patterns:** retention, urgency
- I/V, pulse: observe after parenteral dose for 1 hr; may need to use atropine subcut 0.6 mg or IV push slowly for bronchoconstriction
- I&O ratio: check for urinary retention, urge incontinence
- **Toxicity:** bradycardia, hypotension, bronchospasm, headache, dizziness, seizures, respiratory depression; product should be discontinued if toxicity occurs

Perform/provide:

- Storage at room temp

Evaluate:

- Therapeutic response: absence of urinary retention, abdominal distention

Teach patient/family:

- To take product exactly as prescribed; 1 hr before meals or 2 hr after meals
- To make position changes slowly; orthostatic hypotension may occur
- To avoid driving, hazardous activities until effects are known

TREATMENT OF OVERDOSE:

Administer atropine 0.6-1.2 mg IV or IM (adult)

⚠ HIGH ALERT

bevacizumab (Rx)

(beh-va-kiz'you-mab)

Avastin

Func. class.: Antineoplastic—miscellaneous

Chem. class.: Monoclonal antibody

Do not confuse:

Avastin/Astelin

ACTION: DNA-derived monoclonal antibody selectively binds to and inhibits activity of human vascular endothelial growth factor (VEGF) to reduce microvascular growth and metastatic disease progression

USES: Non–small-cell lung cancer (NSCLC), metastatic carcinoma of the colon or rectum in combination with 5-FU IV; renal cell carcinoma, glioblastoma

Unlabeled uses: Adjunctive for pancreatic/neovascular/ovarian cancer; (wet) macular degeneration

CONTRAINDICATIONS:
Hypersensitivity

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, CHF, blood dyscrasias, CV disease, hypertension, surgery, thromboembolic disease, hamster protein/murine hypersensitivity

Black Box Warning: GI perforation, wound dehiscence

DOSAGE AND ROUTES

Non–small-cell lung cancer

• **Adult: IV** 15 mg/kg over 60-90 min with CARBOplatin and paclitaxel q3wk

Colorectal cancer

• **Adult: IV INF** 5-10 mg/kg q14days given over 90 min; if well tolerated, next inf may be given over 60 min; if 60-min infs well tolerated, subsequent inf may be given over 30 min

Metastatic renal cell carcinoma

• **Adult: IV** 10 mg/kg q2wk with interferon alfa 9 million units SUBCUT 3×/wk up to 52 wk

Glioblastoma single agent

• **Adult: IV** 10 mg/kg q2wk given over 60-90 min; 28-day cycle

Advanced pancreatic cancer (unlabeled)

• **Adult: IV** 10 mg/kg on days 1, 15 with gemcitabine 1000 mg/m^2 on days 1, 8, 15 in 28-day cycle

Metastatic Breast Cancer (unlabeled)

• **Adult: IV** 15 mg/kg on day 1 with docetaxel 100 mg/m^2 q3wk, up to 9 cycles (those who have not received previous chemotherapy)

Metastatic renal cell cancer (unlabeled)

• **Adult (single agent): IV** 10 mg/kg over 60-90 min q2wk; may be given in combination with other products

Ovarian cancer (unlabeled)

• **Adult: IV** 15 mg/kg q21days until unacceptable toxicity, disease progression

Neovascular (wet) macular degeneration (unlabeled)

• **Adult: INTRAVITREOUS INJ** 1.25 mg monthly

Available forms: Inj 25 mg/ml

Administer:

Intermittent IV INF route

• Do not give by IV bolus, IV push; do not shake vial

• Withdraw amount of product to be given, dilute in 100 ml 0.9% NaCl, discard any unused portion

Black Box Warning: Wound dehiscence: do not give for ≥28 days after surgery; make sure wound is healed before giving product

• Give as IV inf over 90 min for 1st dose and 60 min thereafter if well tolerated; subsequent inf may be given over 30 min; do not admix with dextrose

• **Rapid infusion rate (unlabeled):** give at rate of 0.5 mg/kg/min for all doses including initial inf (5 mg/kg over 10 min; 10 mg/kg over 20 min; 15 mg/kg over 30 min)

SIDE EFFECTS

CNS: *Asthenia, dizziness,* intracranial hemorrhage (malignant glioma), headache, fatigue, confusion

CV: Deep vein thrombosis, hypo/hypertension, hypertensive crisis, heart failure

GI: Nausea, vomiting, *anorexia, diarrhea,* constipation, *abdominal pain,* colitis, stomatitis, GI hemorrhage/perforation

GU: Proteinuria, urinary frequency/urgency, nephrotic syndrome, ovarian failure

HEMA: Leukopenia, neutropenia, thrombocytopenia, microangiopathic hemolytic anemia, thromboembolism, bleeding

META: Bilirubinemia, hypokalemia

MISC: Exfoliative dermatitis, hemorrhage, non-GI fistula formation, *alopecia, impaired wound healing,* osteonecrosis of the jaw

RESP: Dyspnea, upper respiratory tract infection

PHARMACOKINETICS

Half-life 20 days, steady-state 100 days

INTERACTIONS

• Avoid concurrent use with SUNItinib; microangiopathic hemolytic anemia may occur

NURSING CONSIDERATIONS

Assess:

- B/P; take frequently if hypertension develops
- For symptoms of infection; may be masked by product
- **CNS reaction:** dizziness, confusion
- **CHF:** crackles, jugular venous distention, dyspnea during treatment
- **⚠ GU status** (proteinuria): nephrotic syndrome may occur; monitor urinalysis for increasing protein level; product should be held if protein ≥2 g/24 hr; resume when <2 g/24 hr

Black Box Warning: Wound dehiscence: Hold for ≥28 days until incision is healed

Black Box Warning: GI perforation, serious bleeding, nephrotic syndrome, hypertensive crisis; product should be discontinued permanently, surgery should be postponed

- Reversible posterior leukoencephalopathy syndrome (RPLS): Discontinue if this disorder develops

Evaluate:

- Therapeutic response: decrease in size of tumors

Teach patient/family:

- To avoid hazardous tasks because confusion, dizziness may occur
- To report signs of infection: sore throat, fever, diarrhea, vomiting
- Not to become pregnant while taking this product or for several months after discontinuing treatment
- To report bleeding, changes in urinary patterns, edema, abdominal pain
- To avoid immunizations

⚠ HIGH ALERT

B

bicalutamide (Rx)

(bye-kal-u'ta-mide)

Casodex

Func. class.: Antineoplastic hormone

Chem. class.: Nonsteroidal antiandrogen

Do not confuse:
Casodex/Kapidex

ACTION: Binds to cytosolic androgen in target tissue, which competitively inhibits the action to androgens

USES: Stage D-2 metastatic prostate cancer in combination with luteinizing-hormone releasing hormone (LHRH) analog

Unlabeled uses: Recurrent priapism

CONTRAINDICATIONS: Pregnancy (X), women, hypersensitivity

Precautions: Breastfeeding, geriatric patients, renal/hepatic disease, diabetes mellitus

DOSAGE AND ROUTES

- **Adult: PO** 50 mg/day with LHRH analog

Recurrent priapism (unlabeled)

- **Adult: PO** 50 mg every other day

Available forms: Tabs 50 mg

Administer:

- At same time each day, either AM or PM, with/without food
- With LHRH treatment; start both products at same time

SIDE EFFECTS

CNS: Dizziness, paresthesia, insomnia, anxiety, neuropathy, headache

CV: CHF, *edema, hot flashes,* hypertension, chest pain, MI

GI: *Diarrhea, constipation, nausea,* vomiting, increased hepatic enzymes, anorexia, dry mouth, melena, *abdominal pain,* hepatitis, hepatotoxicity

GU: *Nocturia, hematuria,* UTI, impotence, gynecomastia; urinary incontinence, frequency, dysuria, retention, urgency; breast tenderness, decreased libido
INTEG: Rash, sweating, dry skin, pruritus, alopecia
MISC: *Infection,* anemia, dyspnea, bone pain, headache, *asthenia, back pain,* flulike symptoms

PHARMACOKINETICS

Well absorbed; peak 31½ hr; metabolized by liver; excreted in urine, feces; half-life 5.8 days; 96% protein binding

INTERACTIONS

Increase: anticoagulation—anticoagulants
Increase: bicalutamide effects—CYP3A4 inhibitors (amiodarone, antiretrovirals, protease inhibitors, clarithromycin, dalfopristin, quinupristin, delavirdine, efavirenz, erythromycin, FLUoxetine, fluvoxaMINE, imatinib, mifepristone, RU-486, nefazodone, some azole antifungals)
Decrease: bicalutamide effects—CYP3A4 inducers (barbiturates, bosentan, carBAMazepine, dexamethasone, nevirapine, OXcarbazepine, phenytoins, rifabutin, rifampin, rifapentine)
Drug/Herb
• May require dosage change when used with St. John's wort
Drug/Food
• Do not use with grapefruit juice
Drug/Lab Test
Increase: AST, ALT, bilirubin, BUN, creatinine
Decrease: Hgb, WBC

NURSING CONSIDERATIONS

Assess:
• For diarrhea, constipation, nausea, vomiting
• For hot flashes, gynecomastia; assure patient that these are common side effects
• Prostate-specific antigen, LFTs
Evaluate:
• Therapeutic response: decreased tumor size, decreased spread of malignancy
Teach patient/family:
• To recognize, report signs of anemia, hepatoxicity, renal toxicity
• That hair may be lost but this is reversible after therapy is completed
• Not to use other products unless approved by prescriber
• To report severe diarrhea
• To use contraception while taking this product

bimatoprost (ophthalmic/topical)

(by-mat'oh-prost)
Latisse, Lumigan
Func. class.: Antiglaucoma agent
Chem. class.: Prostaglandin agonist

Do not confuse:
latanoprost/travoprost

ACTION:

Latisse
Promotion of eyelash growth, thickness, and darkness: unknown; possible increase in the percent of hairs and an increase in the duration of the hair growth (anagen) phase
Lumigan
Reduction of intraocular pressure (IOP) in patients with ocular hypertension or open-angle glaucoma; selectively mimics endogenous prostamides to produce ocular hypotension

USES: Increased intraocular pressure in those with open-angle glaucoma/ocular hypertension (Lumigan); eyelash hypotrichosis (Latisse)

CONTRAINDICATIONS: Hypersensitivity to this product, benzalkonium chloride

Precautions: Children, intraocular inflammation, closed-angle glaucoma, macular edema, contact lenses

DOSAGE AND ROUTES

Increased intraocular pressure/ ocular hypertension (Lumigan)

• **Adult: OPHTH Instill** 1 drop in each affected eye (conjunctival sac) every night

Eyelash Hypotrichosis (Latisse)

• **Adult: Apply** 1 drop to skin of upper eyelid margin at base of eyelashes every night using a new supplied disposable sterile applicator

Available forms: Ophthalmic solution 0.01%, 0.03%; topical solution 0.03%

SIDE EFFECTS

Conjunctival hyperemia, growth of eyelashes (hypertrichosis), ocular pigment changes ocular pruritus, xerophthalmia, visual disturbance, ocular irritation/burning, foreign body sensation, ocular pain, blepharitis, cataracts, superficial punctate keratitis

INTEG: Hyperpigmentation of the periocular skin, eyelash darkening, lacrimation, photophobia, conjunctivitis, asthenopia, iritis, macular edema

MISC: Influenza, upper respiratory tract infections, asthenia, headache, hirsutism

PHARMACOKINETICS

Ophthalmic: Onset 4 hr, peak 8-12 hr; half-life 45 min

INTERACTIONS

Decrease: Intraocular pressure lowering effect—latanoprost, travoprost (no longer available in the US)

Drug/Lab Test

Increase: LFTs

NURSING CONSIDERATIONS

Assess:

• **Intraocular pressure:** in those with ongoing increased IOP or those using latanoprost, travoprost (no longer available in the US)

Evaluate:

• Decreasing IOP or increased growth of eyelashes

Teach patient/family:

Ophthalmic route (Lumigan)

• To wash hands before and after use; remove contact lenses before use and reinsert 15 min after use; Lumigan contains benzalkonium chloride, which can be absorbed by soft contact lenses

• To tilt the head back slightly and pull the lower eyelid down with the index finger to form a pouch. Squeeze the prescribed number of drops into the pouch and gently close the eyes for 1–2 min; do not blink; to avoid contamination, do not touch the tip of the dropper to the eye, fingertips, or other surface

• That the solution may be used concomitantly with other topical ophthalmic drug products to lower IOP. If more than one topical ophthalmic drug is being used, the drugs should be administered at least 5 min apart

Topical route (Latisse)

• To ensure the patient's face is clean and makeup is removed before using Latisse; the disposable sterile applicator is the only applicator that should be used. Each applicator should be used for 1 eye only; dispose of the applicator after each use; after applying 1 drop of solution to the applicator, apply evenly along the skin of the upper eyelid margin at the base of the eyelashes; blot excess solution runoff outside the upper eyelid margin with a tissue or other absorbent cloth; do not apply to the lower eyelash line

bisacodyl (Rx, OTC)

(bis-a-koe'dill)

Alophen, Correctol, Dacodyl, Dulcolax, Ex-Lax Ultra Tab, Femilax, Feminine, Good Sense Women's, Leader Laxative, Top Care Laxative, Veracolate, Walgreens Gentle, Walgreens Women's

Func. class.: Laxative, stimulant

Chem. class.: Diphenylmethane

ACTION: Acts directly on intestine by increasing motor activity; thought to irritate colonic intramural plexus

USES: Short-term treatment of constipation; bowel or rectal preparation for surgery, examination

CONTRAINDICATIONS: Hypersensitivity, rectal fissures, abdominal pain, nausea, vomiting, appendicitis, acute surgical abdomen, ulcerated hemorrhoids, acute hepatitis, fecal impaction, intestinal/biliary tract obstruction

Precautions: Pregnancy (C), breastfeeding

DOSAGE AND ROUTES

- **Adult and child ≥12 yr: PO** 10-15 mg in PM or AM; may use up to 30 mg for bowel or rectal preparation; **RECT** 10 mg as a single dose; 30-ml enema
- **Child 3-11 yr: PO** 5-10 mg as a single dose; **RECT** 5-10 mg as a single dose

Available forms: Tabs del rel 5, 10 mg; enteric-coated tabs 5 mg; supp 5, 10 mg; enema 10 mg/30 ml

Administer:

PO route

- Swallow tabs whole with full glass of water; do not break, crush, chew tabs
- Alone only with water for better absorption; do not take within 1 hr of other products or within 1 hr of antacids, milk, H_2 antagonists; do not take enteric product with proton-pump inhibitors
- In AM or PM

Rectal route

- Insert high in rectum

SIDE EFFECTS

CNS: Muscle weakness

GI: *Nausea, vomiting, anorexia, cramps,* diarrhea, rectal burning (suppositories)

META: Protein-losing enteropathy, alkalosis, hypokalemia, tetany; electrolyte, fluid imbalances

PHARMACOKINETICS

Small amounts metabolized by liver; excreted in urine, bile, feces, breast milk

PO: Onset 6-10 hr

RECT: Onset 15-60 min

INTERACTIONS

Increase: gastric irritation—antacids, milk, H_2-blockers, gastric acid pump inhibitors

Drug/Food

- Increase irritation—dairy products separate by 2 hr

Drug/Lab

Increase: Sodium phosphate

Decrease: Calcium, magnesium

NURSING CONSIDERATIONS

Assess:

- Blood, urine electrolytes if product is used often by patient
- I&O ratio to identify fluid loss
- Cause of constipation; identify whether fluids, bulk, exercise missing from lifestyle; determine use of constipating products
- **GI symptoms:** cramping, rectal bleeding, nausea, vomiting; if these symptoms occur, product should be discontinued
- Multiple products/routes may be used for bowel prep

Evaluate:

- Therapeutic response: decrease in constipation

Teach patient/family:
- Not to use laxatives for long-term therapy because bowel tone will be lost, 1 wk use is usually sufficient
- That normal bowel movements do not always occur daily
- Not to use in presence of abdominal pain, nausea, vomiting
- To notify prescriber if constipation is unrelieved or if symptoms of electrolyte imbalance occur: muscle cramps, pain, weakness, dizziness
- To take with a full glass of water, do not take with dairy products
- Identify bulk, water, constipating products, exercise in patient's life

bismuth subsalicylate (OTC)

(bis'muth sub-sal-iss'uh-late)

Bismatrol, Equaline Stomach Relief, Good Sense Stomach Relief, GNP Pink Bismuth, Leader Pink Bismuth, Peptic Relief, Pepto-Bismol, Pink Bismuth, Top Care Stomach Relief, Walgreens Soothe

Func. class.: Antidiarrheal, weak antacid

Chem. class.: Salicylate

Do not confuse:
Kaopectate/Kayoxalate

ACTION: Inhibits the prostaglandin synthesis responsible for GI hypermotility, intestinal inflammation; stimulates absorption of fluid and electrolytes; binds toxins produced by *Escherichia coli*

USES: Diarrhea (cause undetermined), prevention of diarrhea when traveling; may be included to treat *Helicobacter pylori*, heartburn, indigestion, nausea

CONTRAINDICATIONS: Children <3 yr, children with chickenpox, history of GI bleeding, renal disease, flu-like symptoms, hypersensitivity to product or salicylates

Precautions: Pregnancy (C), breast-feeding, geriatric patients, anticoagulant therapy, immobility, gout, diabetes mellitus, bleeding disorders, previous hypersensitivity to NSAIDs, *Clostridium-difficile*–associated diarrhea when used with antiinfectives for *H. pylori*

DOSAGE AND ROUTES

Antidiarrheal/Gastric Distress
- **Adult: PO** 2 tabs or 30 ml (15 ml extra/max strength) q30min or 2 tabs q60min, max 4.2 g/24 hr

Antiulcer (unlabeled)
- **Adult/adolescent: PO** 525 mg qid, max 4.2 g/24 hr; given with metroNIDAZOLE or tetracycline and acid-suppressive therapy × 14 days

Available forms: Tabs 262 mg; chewable tabs 262 mg; susp 87 mg/5 ml, 130 mg/15 ml, 262 mg/15 ml, 525 mg/15 ml

Administer:

PO route
- Increased fluids to rehydrate patient
- **Susp:** shake liquid before using
- Tabs can be chewed, dissolved in mouth; caplets to be swallowed whole with water

SIDE EFFECTS

CNS: Confusion, twitching, neurotoxicity (high doses)

EENT: Hearing loss, tinnitus, metallic taste, blue gums, black tongue

GI: Increased fecal impaction (high doses), dark stools, constipation, diarrhea, nausea

HEMA: Increased bleeding time

PHARMACOKINETICS

PO: Onset 1 hr, peak 2 hr, duration 4 hr

INTERACTIONS

Increase: toxicity—salicylates, methotrexate

Increase: effects of oral anticoagulants, oral antidiabetics
Decrease: absorption of tetracycline, quinolones, separate for ≥2 hr
Drug/Lab Test
Interference: radiographic studies of GI system

NURSING CONSIDERATIONS

Assess:
• **Diarrhea:** bowel pattern before product therapy, after treatment
• Electrolytes potassium, sodium, chloride if diarrhea is severe or continues long term; assess skin turgor, other signs of dehydration
Evaluate:
• Therapeutic response: decreased diarrhea, absence of diarrhea when traveling; resolution of ulcers
Teach patient/family:
• To chew, dissolve medication in mouth; not to swallow whole; to shake liquid before using
• To avoid other salicylates unless directed by prescriber; not to give to children, possibility of Reye's syndrome
• That stools may turn black; that tongue may darken; that impaction may occur in debilitated patients
• To stop use if symptoms do not improve within 2 days or become worse or if diarrhea is accompanied by high fever

bisoprolol (Rx)

(bis-oh'pro-lole)
Zebeta
Func. class.: Antihypertensive
Chem. class.: β_1-Blocker

Do not confuse:
Zebeta/DiaBeta/Zetia

ACTION: Preferentially and competitively blocks stimulation of β_1-adrenergic receptors within cardiac muscle (decreases rate of SA node discharge, increases recovery time), slows conduction of AV node, decreases heart rate, which decreases O_2 consumption in myocardium; decreases renin-angiotensin-aldosterone system; inhibits β_2-receptors in bronchial and vascular smooth muscle at high doses

USES: Mild to moderate hypertension
Unlabeled uses: Stable angina, stable CHF

CONTRAINDICATIONS: Hypersensitivity to β-blockers, cardiogenic shock, heart block (2nd, 3rd degree), sinus bradycardia, CHF, cardiac failure
Precautions: Pregnancy (C), breastfeeding, children, major surgery, diabetes mellitus, thyroid/renal/hepatic disease, COPD, asthma, well-compensated heart failure, aortic or mitral valve disease, peripheral vascular disease, myasthenia gravis

Black Box Warning: Abrupt discontinuation

DOSAGE AND ROUTES

Hypertension
• **Adult: PO** 2.5-5 mg/day; may increase to 20 mg/day if necessary; max 20 mg/day
Renal/hepatic dose
• **Adult: PO** CCr <40 ml/min 2.5 mg, titrate upward
Angina (unlabeled)
• **Adult: PO** 5-20 mg/day
Heart failure (unlabeled)
• **Adult: PO** 1.25 mg/day × 48 hr, then 2.5 mg/day for 1st mo, then 5 mg/day; max 10 mg/day
Available forms: Tabs 5, 10 mg
Administer:
• Product before meals, bedtime; tab may be crushed, swallowed whole; may give without regard to meals
• Reduced dosage with renal/hepatic dysfunction

SIDE EFFECTS

CNS: Vertigo, headache, insomnia, fatigue, dizziness, mental changes, memory loss, hallucinations, depression, lethargy,

drowsiness, strange dreams, catatonia, peripheral neuropathy
CV: Ventricular dysrhythmias, profound hypotension, bradycardia, CHF, cold extremities, postural hypotension, 2nd- or 3rd-degree heart block
EENT: Sore throat; dry, burning eyes
ENDO: Increased hypoglycemic response to insulin
GI: Nausea, diarrhea, vomiting, mesenteric arterial thrombosis, ischemic colitis, flatulence, gastritis, gastric pain
GU: Impotence, decreased libido
HEMA: Agranulocytosis, thrombocytopenia, purpura, eosinophilia
INTEG: Rash, flushing, alopecia, pruritus, sweating
MISC: Facial swelling, weight gain, decreased exercise tolerance
MS: Joint pain, arthralgia
RESP: Bronchospasm, dyspnea, wheezing, cough, nasal stuffiness

PHARMACOKINETICS

Peak 2-4 hr, half-life 9-12 hr, 50% excreted unchanged in urine, protein binding 30%-36%, metabolized in liver to inactive metabolites

INTERACTIONS

Increase: hypotension—reserpine, guanethidine
Increase: myocardial depression—calcium channel blockers
Increase: antihypertensive effect—ACE inhibitors, α-blockers, calcium channel blockers, diuretics
Increase: bradycardia—digoxin, amiodarone
Increase: peripheral ischemia—ergots
Increase: antidiabetic effect—antidiabetics
Decrease: antihypertensive effect—NSAIDs, salicylates
Drug/Herb
Increase: β-blocking effect—hawthorn
Decrease: β-blocking effect—ephedra
Drug/Lab Test
Increase: AST, ALT, ANA titer, blood glucose, BUN, uric acid, potassium, lipoprotein
Interference: glucose/insulin tolerance tests

NURSING CONSIDERATIONS

B

Assess:
- **Hypertension:** B/P during beginning treatment, periodically thereafter; pulse q4hr: note rate, rhythm, quality; apical/radial pulse before administration; notify prescriber of any significant changes (pulse <50 bpm)
- Baselines of renal, hepatic studies before therapy begins
- **CHF:** I&O, weight daily; increased weight, jugular venous distention, dyspnea, crackles, edema in feet, legs daily
- Skin turgor, dryness of mucous membranes for hydration status, especially for geriatric patients

Perform/provide:
- Storage protected from light, moisture; place in cool environment

Evaluate:
- Therapeutic response: decreased B/P after 1-2 wk

Teach patient/family:

Black Box Warning: Not to discontinue product abruptly; may cause precipitate angina, rebound hypertension; evaluate noncompliance

- Not to use OTC products that contain α-adrenergic stimulants (e.g., nasal decongestants, OTC cold preparations) unless directed by prescriber
- To report bradycardia, dizziness, confusion, depression, fever, cold extremities
- To take pulse at home; advise when to notify prescriber
- To avoid alcohol, smoking, sodium intake
- To comply with weight control, dietary adjustments, modified exercise program
- To carry emergency ID to identify product, allergies
- To avoid hazardous activities if dizziness is present

⚠ To report symptoms of CHF: difficulty breathing, especially on exertion or when lying down, night cough, swelling of extremities

• That, if diabetic, product may mask signs of hypoglycemia or alter blood glucose levels

TREATMENT OF OVERDOSE:

Lavage, IV atropine for bradycardia; IV theophylline for bronchospasm; digoxin, O_2, diuretic for cardiac failure; hemodialysis, IV glucose for hypoglycemia; IV diazepam or phenytoin for seizures

⚠ HIGH ALERT

bivalirudin (Rx)

(bye-val-i-rue'din)

Angiomax

Func. class.: Anticoagulant

Chem. class.: Thrombin inhibitor

ACTION:

Direct inhibitor of thrombin that is highly specific; able to inhibit free and clot-bound thrombin

USES:

Unstable angina in patients undergoing percutaneous transluminal coronary angioplasty (PTCA), used with aspirin; heparin-induced thrombocytopenia, with/without thrombosis syndrome

Unlabeled uses: Acute MI, DVT prophylaxis

CONTRAINDICATIONS:

Hypersensitivity, active bleeding, cerebral aneurysm, intracranial hemorrhage, recent surgery, CVA

Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, renal function impairment, hepatic disease, asthma, blood dyscrasias, thrombocytopenia, GI ulcers, hypertension

DOSAGE AND ROUTES

• **Adult: IV BOL** 0.75 mg/kg then **IV INF** 1.75 mg/kg/hr for 4 hr; another **IV INF** may be used at 0.2 mg/kg/hr for ≤20 hr; this product is intended to be used with aspirin (325 mg/day) adjusted to body weight

Renal dose

• **Adult: IV** CCr ≥30 ml/min no adjustment; CrL 10-29 ml/min consider reducing to 1 mL/kg/hr

Acute MI (unlabeled)

• **Adult: IV BOL** 0.25 mg/kg then **CONT IV INF** 0.5 mg/kg/hr × 12 hr

DVT prophylaxis (unlabeled)

• **Adult: SUBCUT** 1 mg/kg q8hr for those undergoing orthopedic surgery

Available forms: Inj, lyophilized 250 mg/vial

Administer:

• Before PTCA; give with aspirin (325 mg)

IV, direct route

• Dilute by adding 5 ml of sterile water for inj/250 mg bivalirudin, swirl until dissolved, further dilute in 50 ml of D_5W or 0.9% NaCl (5 mg/ml), give by bolus inj 0.75 mg/kg, then intermittent inf

Continuous IV INF route

• To each 250-mg vial add 5 ml of sterile water for inj, swirl until dissolved, further dilute in 500 ml D_5W or 0.9% NaCl (0.5 mg/ml); give inf after bolus dose at a rate of 1.75 mg/kg/hr; may give an additional inf at 0.2 mg/kg/hr

• Do not mix other IV medications with bivalirudin or provide via the same IV line as bivalirudin

Y-site compatibilities: Abciximab, acyclovir, alfentanil, allopurinol, amifostine, amikacin, aminocaproic acid, aminophylline, amphotericin B liposome, ampicillin, ampicillin-sulbactam, anidulafungin, argatroban, arsenic trioxide, atenolol, atracurium, atropine, azithromycin, aztreonam, bleomycin, bumetanide, buprenorphine, busulfan, butorphanol, calcium chloride/gluconate, capreomycin, CARBOplatin, carmustine, ceFAZolin, cefepime, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, cefTAZidime, ceftizoxime, cefTRIAXone, cefuroxime, chloramphenicol, cimetidine, ciprofloxacin, cisatracurium, CISplatin, clindamycin, cyclophosphamide, cycloSPORINE, cytarabine, dacarbazine,

DACTINomycin, DAPTOmycin, DAUNOrubicin, DAUNOrubicin liposome, dexamethasone, dexmedetomidine, dexrazoxane, digoxin, diltiazem, diphenhydrAMINE, DOCEtaxel, dolasetron, DOPamine, DOXOrubicin, DOXOrubicin liposomal, doxycycline, droperidol, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, epoprostenol, eptifibatide, ertapenem, erythromycin, esmolol, etoposide, etoposide phosphate, famotidine, fenoldopam, fentaNYL, fluconazole, fludarabine, fluorouracil, foscarnet, fosphenytoin, furosemide, gallium, ganciclovir, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, haloperidol, heparin, hydrALAZINE, hydrocortisone, HYDROmorphone, hydrOXYzine, IDArubicin, ifosfamide, imipenem-cilastatin, inamrinone, insulin (regular), irinotecan, isoproterenol, ketorolac, labetalol, leucovorin, levofloxacin, lidocaine, linezolid, LORazepam, magnesium, mannitol, mechlorethamine, melphalan, meperidine, meropenem, mesna, methohexital, methotrexate, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, midazolam, milrinone, mitoMYcin, mitoXANtrone, mivacurium, morphine, moxifloxacin, mycophenolate mofetil, nafcillin, nalbuphine, naloxone, nesiritide, niCARdipine, nitroglycerin, nitroprusside, norepinephrine, octreotide, ofloxacin, ondansetron, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pamidronate, pancuronium, PEMEtrexed, PENTobarbital, PHENobarbital, phenylephrine, piperacillin, piperacillin-tazobactam, polymyxin B, potassium acetate/chloride/phosphates, procainamide, promethazine, propranolol, ranitidine, remifentanil, rocuronium, sodium acetate/bicarbonate/phosphates, streptozocin, succinylcholine, SUFentanil, sulfamethoxazole-trimethoprim, tacrolimus, teniposide, theophylline, thiopental, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, tobramycin, topotecan, vasopressin, vecuronium, verapamil, vinBLAStine, vinCRIStine, vinorelbine, voriconazole, warfarin, zidovudine, zoledronic acid

SUBCUT injection (unlabeled)

- May be used for DVT prophylaxis

SIDE EFFECTS

CNS: *Headache, insomnia, anxiety, nervousness*

CV: *Hypo/hypertension, bradycardia*

GI: *Nausea, vomiting, abdominal pain, dyspepsia*

HEMA: Hemorrhage, thrombocytopenia

MISC: Pain at inj site, pelvic pain, urinary retention, fever, anaphylaxis

MS: *Back pain*

PHARMACOKINETICS

Excreted in urine, half-life 25 min, duration 1 hr, no protein binding

INTERACTIONS

Increase: bleeding risk—anticoagulants, aspirin, treprostinil, thrombolytics

Drug/Herb

Increase: bleeding risk—agrimony, alfalfa, angelica, anise, bilberry, black haw, bogbean, buchu, cat's claw, chamomile, chondroitin, devil's claw, dong quai, evening primrose, fenugreek, feverfew, fish oil, garlic, ginger, ginkgo, ginseng, horse chestnut, Irish moss, kava, kelp, kelpware, khella, licorice, lovage, lungwort, meadowsweet, motherwort, mugwort, nettle, papaya, parsley (large amts), pau d'arco, pineapple, poplar, prickly ash, red clover, safflower, saw palmetto, senega, skullcap, tonka bean, turmeric, wintergreen, yarrow

Decrease: anticoagulant effect—coenzyme Q10, flax, glucomannan, goldenseal, guar gum

NURSING CONSIDERATIONS

Assess:

- Baseline and periodic ACT, APTT, PT, INR, TT, platelets, Hgb, Hct

Bleeding: check arterial and venous sites, IM inj sites, catheters; all punctures should be minimized; fall in B/P or Hct

may indicate hemorrhage, hematoma, hemorrhage at puncture site are more common in the elderly
- Fever, skin rash, urticaria
- CV status: B/P, watch for hypo/hypertension, bradycardia
- Neurologic status: any focal or generalized deficits should be reported immediately
- PCI use: possible thrombosis, stenosis, unplanned stent, prolonged ischemia, decreased reflow

Perform/provide:
- Storage of reconstituted vials in refrigerator for up to 24 hr; store diluted conc at room temp for 24 hr

Evaluate:
- Therapeutic response: anticoagulation with PTCA; resolution of heparin-induced thrombocytopenia, thrombosis syndrome

Teach patient/family:
- About the reason for the product and expected results
- To report black, tarry stools; blood in urine; difficulty breathing
- Not to use any OTC, herbal product unless approved by prescriber
- Not to use hard-bristle toothbrush, regular razor to avoid any injury, hemorrhage may result

⚠ HIGH ALERT

bleomycin (Rx)

(blee-oh-mye'sin)

Blenoxane

Func. class.: Antineoplastic, antibiotic

Chem. class.: Glycopeptide

ACTION: Inhibits synthesis of DNA, RNA, protein; derived from *Streptomyces verticillus;* phase specific to the G_2 and M phases; a nonvesicant, sclerosing agent

USES: Cancer of head, neck, penis, cervix, vulva of squamous cell origin; Hodgkin's/non-Hodgkin's disease; testicular carcinoma; as a sclerosing agent for malignant pleural effusion

Unlabeled uses: Cutaneous T-cell lymphoma (CTCL), hemangioma, Kaposi's sarcoma, malignant ascites, verruca plantaris/vulgaris, osteogenic sarcoma

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, hypersensitivity, prior idiosyncratic reaction

Precautions: Patients >70 yr old, renal/hepatic disease, respiratory disease

Black Box Warning: Idiosyncratic reaction, pulmonary fibrosis

DOSAGE AND ROUTES

Test dose
- **Adult and child (unlabeled): IM/IV/SUBCUT** ≤2 units for first 2 doses followed by 24 hr of observation
- **Adult and child: SUBCUT/IV/IM** 0.25-0.5 units/kg 1-2 ×/wk or 10-20 units/m^2, then 1 unit/day or 5 units/wk; may also be given by **CONT INF;** do not exceed total dose of 400 units during lifetime

Renal dose
- **Adult/child:** CCr 40-50 ml/min reduce dose by 30%; CCr 30-39 ml/min reduce dose by 40%; CCr 20-29 ml/min reduce dose by 45%; CCr 10-19 ml/min reduce dose by 55%; CCr 5-10 ml/min reduce dose by 60%

Cutaneous T-cell lymphoma (CTCL) (unlabeled)
- **Adult: IV** 15 units twice weekly with vinBLAStine and predniSONE

Kaposi's sarcoma (unlabeled)
- **Adult: IV** 15 units q2wk with DOXOrubicin and vinCRIStine

Available forms: Powder for inj, 15, 30 units/vial

Administer:
- Antiemetic 30-60 min before giving product to prevent vomiting; continue antiemetics 6-10 hr after treatment
- Topical or systemic analgesics for pain of stomatitis as ordered; antihistamines and antipyretics for fever, chills

• May be given IM, subcut, IV, intrapleurally, intralesionally, intraarterially

IM/SUBCUT route

• After reconstituting 15 units/1-5 ml or 30 mg/2-10 ml of 0.9% NaCl or bacteriostatic water for inj, rotate inj sites; do not use products that contain benzyl alcohol when giving to neonates or that contain dextrose because of loss of potency

Intrapleural route

• 60 units/100 ml of 0.9% NaCl administered by MD through thoracostomy tube

IV route

• Use cytotoxic handling procedures

• After reconstituting 15- or 30-unit vial with 5 or 10 ml of NS, respectively, inj slowly over 10 min or after further dilution with 50-100 ml 0.9% NaCl; give 15 units or less over 10 min through Y-tube or 3-way stopcock

• For patients with lymphoma, give 2 test doses of 2-5 units before initial dose; monitor for anaphylaxis

Y-site compatibilities: Acyclovir, alfentanil, allopurinol, amifostine, amikacin, aminocaproic acid, aminophylline, amiodarone, ampicillin, ampicillin-sulbactam, anidulafungin, atenolol, atracurium, azithromycin, aztreonam, bivalirudin, bumetanide, buprenorphine, busulfan, butorphanol, calcium chloride/gluconate, CARBOplatin, carmustine, caspofungin, ceFAZolin, cefepime, cefotaxime, cefoTEtan, cefOXitin, cefTAZidime, ceftizoxime, cefTRIAXone, cefuroxime, chloramphenicol, chlorproMAZINE, cimetidine, ciprofloxacin, cisatracurium, CISplatin, clindamycin, codeine, cyclophosphamide, cycloSPORINE, cytarabine, dacarbazine, DACTINomycin, DAPTOmycin, DAUNOrubicin, dexamethasone, dexmedetomidine, dexrazoxane, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, doxacurium, DOXOrubicin, DOXOrubicin liposomal, doxycycline, droperidol, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, ertapenem, erythromycin, esmolol, etoposide, famotidine, fenoldopam, fentaNYL, filgrastim, fluconazole, fludarabine, fluorouracil, foscarnet, fosphenytoin, furosemide, ganciclovir, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, haloperidol, heparin, hydrALAZINE, hydrocortisone sodium succinate, HYDROmorphone, hydrOXYzine, IDArubicin, ifosfamide, imipenem-cilastatin, inamrinone, insulin (regular), irinotecan, isoproterenol, ketorolac, labetalol, leucovorin, levofloxacin, levorphanol, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, melphalan, meperidine, meropenem, mesna, metaraminol, methohexital, methotrexate, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, midazolam, milrinone, minocycline, mitoMYcin, mitoXANtrone, mivacurium, morphine, nafcillin, nalbuphine, naloxone, nesiritide, niCARdipine, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxaliplatin, palonosetron, pamidronate, pancuronium, pantoprazole, PEMEtrexed, pentamidine, pentazocine, PENTobarbital, PHENobarbital, phenylephrine, piperacillin, piperacillin-tazobactam, polymyxin B, potassium chloride, potassium phosphates, procainamide, prochlorperazine, promethazine, propranolol, quiNIDine, ranitidine, remifentanil, riTUXimab, rocuronium, sargramostim, sodium acetate, sodium bicarbonate, sodium phosphates, succinylcholine, SUFentanil, sulfamethoxazole-trimethoprim, tacrolimus, teniposide, theophylline, thiopental, thiotepa, ticarcillin, ticarcillin-clavulanate, tirofiban, tobramycin, tolazoline, trastuzumab, trimethobenzamide, vancomycin, vasopressin, vecuronium, verapamil, vinBLAStine, vinCRIStine, vinorelbine, voriconazole, zidovudine

SIDE EFFECTS

CNS: Pain at tumor site, headache, confusion

CV: MI, stroke

GI: *Nausea, vomiting, anorexia, stomatitis, weight loss,* ulceration of mouth, lips
GU: Hemolytic-uremic syndrome
IDIOSYNCRATIC REACTION: Hypotension, *confusion, fever,* chills, wheezing
INTEG: *Rash, hyperkeratosis, nail changes, alopecia,* pruritus, acne, striae, peeling, hyperpigmentation, phlebitis
RESP: Fibrosis, pneumonitis, wheezing, pulmonary toxicity
SYST: Anaphylaxis, radiation recall, Raynaud's phenomenon

PHARMACOKINETICS

Half-life 2 hr; when CCr is >35 ml/min, half-life is increased with lower clearance; metabolized in liver; 50% excreted in urine (unchanged)

INTERACTIONS

• Avoid live virus vaccines concurrently
Increase: toxicity—other antineoplastics, radiation therapy, general anesthesia, filgrastim, sargramostim
Decrease: serum phenytoin levels—phenytoin, fosphenytoin
Drug/Lab Test
Increase: uric acid

NURSING CONSIDERATIONS

Assess:
• IM test dose in patients with lymphoma of 1-2 units before 1st 2 doses

Black Box Warning: **Pulmonary toxicity/fibrosis:** pulmonary function tests; chest x-ray before, during therapy, should be obtained q2wk during treatment; pulmonary diffusion capacity for carbon monoxide (DLCO) monthly, if <40% of pretreatment value, stop treatment; treat pulmonary infection before treatment; dyspnea, crackles, unproductive cough, chest pain, tachypnea, fatigue, increased pulse, pallor, lethargy, more common in the elderly, radiation therapy, pulmonary disease

• Temp; fever may indicate beginning infection
• Renal status: serum creatinine/BUN; CBC
• Effects of alopecia, skin color alterations on body image; discuss feelings about body changes
• Buccal cavity q8hr for dryness, sores, ulceration, white patches, oral pain, bleeding, dysphagia
• Local irritation, pain, burning, discoloration at inj site
⚠ **Anaphylaxis:** rash, pruritus, urticaria, purpuric skin lesions, itching, flushing, wheezing, hypotension; have emergency equipment available

Black Box Warning: **Idiosyncratic reaction:** hypotension, mental confusion, fever, chills, wheezing

Perform/provide:
• Storage for 2 wk after reconstituting if refrigerated or for 24 hr at room temp; discard unused portions
• Rinsing of mouth tid-qid with water, club soda; brushing of teeth with baking soda bid-tid with soft brush or cotton-tipped applicators for stomatitis; use unwaxed dental floss
Evaluate:
• Therapeutic response: decrease in size of tumor
Teach patient/family:
• To report any changes in breathing, coughing, fever
• That hair may be lost during treatment and that wig or hairpiece may make patient feel better; that new hair may be different in color, texture
• To avoid foods with citric acid, hot or rough texture
• To report any bleeding, white spots, ulcerations in mouth; to examine mouth daily and report symptoms
• To use contraception during treatment (pregnancy D), avoid breastfeeding
• Not to receive vaccines during treatment

boceprevir

(boe-se'pre-vir)

Victrelis

Func. class.: Antiviral, anti-hepatitis agents

ACTION: Prevents hepatitis C viral (HCV) replication by blocking the activity of HCV NS3/4A serine protease. Hepatitis C virus NS3/4A serine protease is an enzyme responsible for the conversion of HCV encoded polyproteins to mature/functioning viral proteins.

USES: Hepatitis C infection in combination with peginterferon alfa and ribavirin

CONTRAINDICATIONS: Pregnancy (X), male partners of women who are pregnant

Precautions: Breastfeeding, neonates, infants, children, adolescents <18 years of age, anemia, neutropenia, thrombocytopenia, HIV, hepatitis B, decompensated hepatic disease, in liver or other organ transplants

DOSAGE AND ROUTES

Chronic hepatitis C infection (genotype 1) compensated liver disease (without cirrhosis, previously untreated with interferon and ribavirin therapy)/ (Partial responders/relapsers)

• **Adults: PO** Before starting therapy peginterferon alfa and ribavirin must be given 4 wk, then add boceprevir 800 mg (four 200 mg caps) PO TID (7-9 hours). Treatment length is determined by HCV RNA conc at treatment wk 4, 8, 12, and 24. If patient has undetectable HCV RNA conc at wk 8 and 24, discontinue all 3 medications at wk 28 (previously untreated); 36 wk (partial responders/relapsers). If HCV RNA is detectable at wk 8 but undetectable at wk 24, the 3-drug regimen through wk 36, then give only peginterferon alfa and ribavirin through treatment wk 48. If the patient has a poor response to peginterferon alfa and ribavirin during the initial 4 wk, continue treatment with all 3 medications for a total of 48 wk. Discontinue the 3-drug regimen if the HCV RNA conc >100 international units/ml at treatment wk 12 or a detectable HCA RNA conc at treatment wk 24.

Chronic hepatitis C infection (genotype 1) compensated liver disease with cirrhosis

• **Adults: PO** Before starting therapy with boceprevir; peginterferon alfa and ribavirin must be given 4 wk; then add boceprevir 800 mg (four 200 mg caps) PO TID (7-9 hr) to peginterferon alfa and ribavirin for an additional 44 wk (48 wk total)

Available forms: Caps 200 mg

Administer:

• Only use in combination with peginterferon alfa and ribavirin; never give as monotherapy.

• Discontinue in hepatitis C virus (HCV) if RNA concentrations ≥100 international units/ml at wk 12 or a confirmed detectable HCV RNA concentrations at wk 24

• Any contraindication to peginterferon alfa or ribavirin also applies to boceprevir.

• Give with food

SIDE EFFECTS

When used in combination with peginterferon/ribavarin

CNS: *Fatigue, chills, asthenia*, insomnia, irritability, dizziness

GI: Nausea, vomiting, diarrhea, dysgeusia, decreased appetite, xerostomia

HEMA: Anemia (Hgb <10 g/dL), neutropenia, thrombocytopenia

INTEG: *Alopecia, rash*, xerosis

MISC: *Arthralgia, exertional dyspnea*

INTERACTIONS

Increase: life-threatening reactions of each product: alfuzosin, ergots (dihydro-

ergotamine, ergotamine, ergonovine, methylergonovine), cisapride, pimozide, lovastatin, simvastatin, ezetimibe, niacin with simvastatin and boceprevir; triazolam, oral midazolam; sildenafil, tadalafil (pulmonary arterial hypertension); do not use concurrently

Increase: adverse reactions of each product—phosphodiesterase type 5 (PDE5) inhibitors (for erectile dysfunction), acetaminophen, alfentanil, aliskiren, almotriptan, alosetron, ALPRAZolam, aminophylline, amiodarone, amitriptyline, amLODIPine, ARIPiprazole, astemizole, atorvastatin, atorvastin, bepridil, boceprevir, bosentan, budesonide, bupivacaine, buprenorphine, busPIRone, carvedilol, cevimeline, chloroquine, cilostazol, cinacalcet, citalopram, clarithromycin, clomiPRAMINE, clonazePAM, clopidogrel, clozAPine, colchicine, cyclobenzaprine, cycloSPORINE, dapsone, DAUNOrubicin, desipramine, desloratadine, dexamethasone, dexlansoprazole, dextromethorphan, diazepam, diclofenac, digoxin, diltiazem, disopyramide, disulfiram, DOCEtaxel, dolasetron, donepezil, DOXOrubicin, droperidol, dutasteride, ebastine, eletriptan, eplerenone, erlotinib, erythromycin, estazolam, eszopiclone, ethosuximide, etoposide, exemestane, felodipine, fentaNYL, fexofenadine, finasteride, flecainide, flunitrazepam, flurazepam, galantamine, gefitinib, glyburide, granisetron, halofantrine, haloperidol, HYDROcodone, ifosfamide, imipramine, indiplon, irinotecan, isradipine, itraconazole, ivermectin, ixabepilone, ketoconazole, lansoprazole, lidocaine, loperamide, loratadine, losartan, maraviroc, mefloquine, meloxicam, mirtazapine, mitoMYcin, montelukast, morphine, nateglinide, niCARdipine, NIFEdipine, nisoldipine, nortriptyline, omeprazole, ondansetron, oxybutynin, oxyCODONE, PACLitaxel, palonosetron, paricalcitol, plicamycin, posaconazole, prasugrel, praziquantel, propafenone, quazepam, QUEtiapine, quinacrine, quiNIDine, ramelteon, repaglinide, rifabutin, risperiDONE, ropivacaine, salmeterol, selegiline, sertraline, sibutramine, silodosin, sirolimus, sitaxsentan, solifenacin, SUFentanil, SUNItinib, systemic corticosteroids, tacrolimus, telithromycin, teniposide, terfenadine, testosterone, theophylline, tiaGABine, tinidazole, tolterodine, tolvaptan, traMADol, traZODone, vardenafil, venlafaxine, verapamil, vinBLAStine, vinCRIStine, voriconazole, warfarin, and others; use cautiously, may need to reduce dose

Increase: hyperkalemia—drospirenone

Decrease: estrogen levels—ethinyl estradiol

Decrease: boceprevir effect—CYP3A4 inhibitors (phenytoin, carBAMazepine, PHENobarbital, rifampin)

Decrease: effect of—methadone

Possible treatment failure: efavirenz, ritonavir, atazanavir, lopinavir with ritonavir

Drug/Herb

- Do not use with St. John's wort

Drug/Lab Test

Decrease: Hgb

NURSING CONSIDERATIONS

Assess:

⚠ **Pregnancy:** obtain a pregnancy test before, monthly during, and for 6 mo after treatment is completed; those who are not willing to practice strict contraception should not receive treatment; report any cases of prenatal ribavirin exposure to the Ribavirin Pregnancy Registry at (800) 593-2214

- **Anemia:** monitor Hgb before, at treatment wk 4, 8, 12, and as needed. If Hgb is <10 g/dL, decrease ribavirin dosage; if Hgb is <8.5 g/dL, discontinuation of therapy is recommended; dosage should not be altered based on adverse reactions; anemia may be managed through ribavirin dose modifications; never alter the dose of boceprevir. If anemia persists despite a reduction in ribavirin dose, consider discontinuing boceprevir. If management of anemia requires permanent discontinuation of ribavirin, treat-

ment with boceprevir MUST also be permanently discontinued. Once boceprevir has been discontinued, it must not be restarted; monitor CBC with differential at treatment wk 4, 8, 12, and at other treatment points as needed

Teach patient/family:

- To take with food to increase absorption
- To use precautions to prevent transmission of hepatitis C
- To inform prescriber of all medications, herbs, supplements used
- To use 2 forms of effective contraception (intrauterine devices and barrier methods) during treatment and for 6 mo after treatment (pregnancy X), to avoid breastfeeding

boric acid otic

See Appendix B

⚠ HIGH ALERT

bortezomib (Rx)

(bor-tez'oh-mib)

Velcade

Func. class.: Antineoplastic—miscellaneous

Chem. class.: Proteasome inhibitor

ACTION: Reversible inhibitor of chymotrypsin-like activity in mammalian cells; causes delay in tumor growth by disrupting normal homeostatic mechanisms

USES: Multiple myeloma previously untreated or when at least 2 other treatments have failed; mantle cell lymphoma who have received ≥1 prior therapy

Unlabeled uses: Non-Hodgkin's lymphoma (NHL)

CONTRAINDICATIONS: Pregnancy (D), breastfeeding; hypersensitivity to product, boron, mannitol

Precautions: Children, geriatric patients, peripheral neuropathy, renal/hepatic disease, hypotension, tumor lysis syndrome, thrombocytopenia, infection, diabetes mellitus, bone marrow suppression

B

DOSAGE AND ROUTES

Multiple myeloma (previously untreated)

- **Adult: IV BOL/SUBCUT** Give for nine 6-wk cycles; cycles 1-4, 1.3 mg/m²/dose given on days 1, 4, 8, 11, then a 10-day rest period (days 12-21), then give again on days 22, 25, 29, 32, then a 10-day rest period (days 33-42); given with melphalan (9 mg/m²/day on days 1-4) and predniSONE (60 mg/m²/day on days 1-4); during cycles 5-9, give bortezomib 1.3 mg/m²/dose on days 1, 8, 22, 29 with melphalan (9 mg/m²/day on days 1-4) and predniSONE (60 mg/m²/day on days 1-4); this 6-wk cycle is considered 1 course; at least 72 hr should elapse between consecutive doses

Mantle cell lymphoma

- **Adult: IV BOL/SUBCUT** 1.3 mg/m²/dose on days 1, 4, 8, 11 followed by a 10-day rest period (days 12 to 21); max 8 cycles

Hepatic dose

- **Adult: IV** bilirubin >1.5 × ULN, reduce to 0.7 mg/m² during cycle 1; consider dose escalation to 1 mg/m² or further reduction to 0.5 mg/m² during next cycles based on tolerability

Non-Hodgkin's Lymphoma (unlabeled)

- **Adult: IV BOL** 1.3 mg/m² on days 1, 4, 8, 11 repeated every 21 days

Available forms: Lyophilized powder for inj 3.5 mg

Administer:

IV bolus route

- **Reconstitute** each vial with 3.5 ml of 0.9% NaCl (1 mg/ml); sol should be clear/colorless; **inj** as bolus over 3-5 sec
- Store unopened product at room temperature, protect from light
- Wear protective clothing during han-

dling, preparation; avoid contact with skin

SIDE EFFECTS

CNS: Anxiety, insomnia, dizziness, headache, *peripheral neuropathy,* rigors, paresthesia, fever
CV: *Hypotension,* edema, CHF
GI: Abdominal pain, *constipation, diarrhea,* dyspepsia, *nausea, vomiting,* anorexia
HEMA: *Anemia,* neutropenia, thrombocytopenia
MISC: Dehydration, weight loss, herpes zoster, *rash,* pruritus, blurred vision
MS: *Fatigue, malaise, weakness,* arthralgia, bone pain, muscle cramps, myalgia, back pain, tumor lysis syndrome
RESP: Cough, pneumonia, dyspnea, URI

PHARMACOKINETICS

Half-life 9-15 hr, protein binding 83%, metabolized by CYP450 enzymes (3A4, 2D6, 2C19, 2C9, 1A2)

INTERACTIONS

• Do not use hematopoietic progenitor cells (sargramostim, filgrastim) within 24 hr of chemotherapy
• Oral hypoglycemics: may result in hypo/hyperglycemia
Increase: risk for bleeding—anticoagulants, NSAIDs, platelet inhibitors, salicylates, thrombolytics
Increase: hypotension—antihypertensives
Increase: peripheral neuropathy—amiodarone, antivirals (amprenavir; atazanavir; didanosine, lamiVUDine, 3TC; ritonavir; stavudine, zidovudine), chloramphenicol, CISplatin, colchicine, cycloSPORINE, dapsone, disulfiram, DOCEtaxel, gold salts, HMG-CoA reductase inhibitors, iodoquinol, INH, metroNIDAZOLE, nitrofurantoin, oxaliplatin, PACLitaxel, penicillamine, phenytoin, sulfaSALAzine, thalidomide, vinBLAStine, vinCRIStine, zalcitabine ddc, isoniazid, statins, others
Increase: toxicity or decrease efficacy when administered with products that induce or inhibit CYP3A4
Drug/Herb
Increase: toxicity or decrease efficacy—St. John's wort

NURSING CONSIDERATIONS

Assess:
• Hematologic status: platelets, CBC throughout treatment; platelets $\geq 70 \times 10^9$/L and ANC $\geq 1.0 \times 10^9$/L before any cycle; nonhematologic toxicities should be grade 1 or baseline before any cycle
• For extravasation at inj site
• B/P, fluid status, peripheral neuropathy symptoms
Evaluate:
• Therapeutic response: improvement of multiple myeloma symptoms
Teach patient/family:
• To use contraception while taking this product (pregnancy [D]); to avoid breastfeeding
• To monitor blood glucose levels if diabetic
• To contact prescriber about new or worsening peripheral neuropathy, severe vomiting, diarrhea, easy bruising, bleeding, infection
• To avoid driving, operating machinery until effect is known
• To avoid using other medications unless approved by prescriber

bosentan (Rx)

(boh'sen-tan)
Tracleer
Func. class.: Vasodilator
Chem. class.: Endothelin receptor antagonist

ACTION: Peripheral vasodilation occurs via the antagonism of the effect of endothelin on endothelium and vascular smooth muscle

USES: Pulmonary arterial hypertension with WHO class III, IV symptoms
Unlabeled uses: Septic shock to improve microcirculatory blood flow, functional class II pulmonary arterial hypertension

CONTRAINDICATIONS

CONTRAINDICATIONS: Hypersensitivity, CVA, CAD

Black Box Warning: Pregnancy X

Precautions: Breastfeeding, children, geriatric patients, mitral stenosis

Black Box Warning: Hepatic disease

DOSAGE AND ROUTES

- **Adult and adolescent >40 kg: PO** 62.5 mg bid × 4 wk then 125 mg bid
- **Adult and adolescent <40 kg: PO** 62.5 mg bid

Available forms: Tabs 62.5, 125 mg
Administer:
- Give without regard to meals
- Only available through the TAP program; 866-228-3546
- Do not stop product abruptly; taper

SIDE EFFECTS

CNS: Headache, flushing, fatigue, fever
CV: *Hypo/hypertension,* palpitations, edema of lower limbs, fluid retention
GI: Abnormal hepatic function, diarrhea, dyspepsia, hepatotoxicity
HEMA: Anemia, leukopenia, neutropenia, lymphopenia, thrombocytopenia
INTEG: Pruritus, anaphylaxis, rash, Stevens-Johnson syndrome, toxic epidermal necrolysis
MISC: Oligospermia, tumor lysis syndrome
SYST: Secondary malignancy

PHARMACOKINETICS

Metabolized by inducer of CYP2C9, CYP3A4, possibly CYP2C19; metabolized by the liver; terminal half-life 5 hr; steady state 3-5 days

INTERACTIONS

- Do not coadminister cycloSPORINE with bosentan; bosentan is increased, cycloSPORINE is decreased
- Do not coadminister glyBURIDE with bosentan; glyBURIDE is decreased significantly, bosentan is also decreased, hepatic enzymes may be increased

Increase: bosentan effects—CYP2C9, CYP3A4 inhibitors
Increase: bosentan level—ketoconazole
Decrease: effects of warfarin, hormonal contraceptives, statins

Drug/Lab Test
Increase: ALT, AST
Decrease: Hgb, Hct

NURSING CONSIDERATIONS

Assess:
- **Serious skin toxicities:** Angioedema occurring 8-21 days after initiating therapy
- B/P, pulse during treatment until stable
- Blood studies: Hct, Hgb after 1 month, 3 months, then every 3 months may be decreased
- Pulmonary hypertension/CHF: Fluid retention, weight gain, increased leg edema; may occur within weeks

Black Box Warning: Hepatic toxicity: vomiting, jaundice; product should be discontinued; hepatic studies: AST, ALT, bilirubin; hepatic enzymes may increase; if ALT/AST >3× and ≤5× ULN, decrease dose or interrupt treatment and monitor AST/ALT q2wk; if bilirubin >2× ULN or signs of hepatitis or hepatic disease are present, stop treatment

Perform/provide:
- Storage at room temp

Evaluate:
- Therapeutic response: decrease in pulmonary hypertension

Teach patient/family:
- To report jaundice, dark urine, joint pain, fatigue, malaise, bruising, easy bleeding

Black Box Warning: Pregnancy (X), monitor pregnancy test monthly

- To avoid pregnancy; to use nonhormonal form of contraception, hormonal contraceptives may not be effective
- That lab work will be required periodically
- To take without regard to food

⚠ HIGH ALERT

brentuximab

(bren-tuk'see-mab)

Adcetris

Func. class.: Monoclonal antibody; antineoplastic

ACTION: The anticancer activity is due to the binding of the ADC to CD30-expressing cells, followed by the internalization and transportation of the ADC-CD30 complex to lysosomes and the release of MMAE via selective proteolytic cleavage. MMAE binds to tubulin and disrupts the microtubule network within the cell, inducing cell cycle arrest and apoptotic death of the cells

USES: For the treatment of Hodgkin's disease after failure of autologous stem cell transplant (ASCT) or after failure of at least 2 prior multiagent chemotherapy regimens in patients who are not ASCT candidates; for the treatment of non-Hodgkin's lymphoma (NHL); for the treatment of systemic anaplastic large cell lymphoma (sALCL) after failure of at least 1 prior multiagent chemotherapy regimen

CONTRAINDICATIONS Hypersensitivity, pregnancy (category D)

Precautions: Breastfeeding, children, infants, neonates, neutropenia, peripheral neuropathy, tumor lysis syndrome (TLS)

Black Box Warning: Progressive multifocal leukoencephalopathy

DOSAGE AND ROUTES

- **Adult: IV** 1.8 mg/kg over 30 min every 3 wk until a maximum of 16 cycles, disease progression, or unacceptable toxicity. For patients >100 kg, max weight used for dosage calculation should be 100 kg, which translates to no more than 180 mg/dose

Dose adjustments for toxicity due to peripheral neuropathy:

- For grade <3: no dosage adjustments are recommended; for new or worsening grade 2-3: interrupt treatment until toxicity resolves to grade ≤1; when resuming treatment, reduce dosage to 1.2 mg/kg IV q3wk; for grade 4: discontinue treatment

Dose adjustments for toxicity due to neutropenia:

- For neutropenia grade <3: no dosage adjustments; for grade 3-4 neutropenia: interrupt treatment until toxicity resolves to baseline or grade ≤2; consider the use of growth factors (CSFs) for subsequent cycles of therapy; for grade 4 neutropenia despite the use of growth factors: discontinue treatment or reduce the dose to 1.2 mg/kg IV q3wk

Available forms: Powder for inj 50 mg

Administer:

Intermittent IV INF route

- Visually inspect for particulate matter and discoloration whenever sol and container permit
- Only as an IV inf, do not give as an IV push or bolus
- Use cytotoxic handling procedures
- Do not mix, or administer as an infusion, with other IV products
- Calculate the dose (mg) and the number of vials required. For patients weighing >100 kg, use 100 kg to calculate the dose; reconstitute each 50-mg vial per 10.5 ml of sterile water for inj (5 mg/ml)
- Direct the stream of sterile water toward the wall of the vial and not directly at the cake or powder; gently swirl the vial to aid in dissolution, do not shake
- Discard any unused portion left in the vial

• After reconstitution, dilute immediately with ≥100 ml of 0.9% sodium chloride, 5% dextrose, or lactated ringers solution to a final concentration (0.4 mg/ml-1.8 mg/ml)
• Infuse over 30 min

SIDE EFFECTS

CNS: Headache, dizziness, *fever,* peripheral neuropathy, anxiety, chills, confusion, *fatigue,* paresthesias, insomnia, night sweats Progressive multifocal leukoencephalopathy
CV: Peripheral edema, supraventricular arrhythmia
GI: *Abdominal pain, nausea, vomiting,* constipation, *diarrhea,* weight loss
INTEG: *Rash,* pruritus, alopecia, xerosis
RESP: Pneumothorax, pneumonitis, pulmonary embolism, dyspnea, *cough*
SYST: Anaphylaxis, tumor lysis syndrome, antibody formation, Stevens-Johnson Syndrome
HEMA: Anemia, neutropenia, thrombocytopenia

PHARMACOKINETICS

Protein binding is 68%-82%, only a small amount is metabolized; potent inhibitors or inducers of CYP3A4 may alter action; ADC peak at end of infusion; MME peak 1-3 days; terminal half-life is 4–6 days; 3 components are released: MMAE (monomethyl auristatin E), ADC, and the total antibody; the half-life of MMAE a component is 3.43-3.6 days

INTERACTIONS

Increase: brentuximab component action: ketoconazole, boceprevir, delavirdine, isoniazid, indinavir, itraconazole, dalfopristin; quinupristin, telithromycin, tipranavir, rifampin, ritonavir
Increase noninfectious pulmonary toxicity: bleomycin, do not use together
Drug/Herb
• Increased brentuximab component action: St. John's Wort

NURSING CONSIDERATIONS

Assess:
• **Tumor lysis syndrome (TLS):** assess for hyperkalemia, hypophosphatemia, hypocalcemia; may develop renal failure may use allopurinol or rasburicase to prevent TLS; monitor serum BUN/creatinine
• **Pregnancy: determine if pregnancy is planned or suspected, pregnancy category D**
• **Peripheral neuropathy: Progressive multifocal leukoencephalopathy:** Assess for weakness, or paralysis, vision loss, impaired speech, and cognitive deterioration; often fatal
• Monitor CBC, and differential
Perform/provide:
• Use the diluted sol immediately or store in refrigerator for ≤24 hr after reconstitution; do not freeze
Evaluate:
• Decreasing symptoms of Hodgkin's disease (increased lymph nodes, night sweats, weight loss, splenomegaly, hepatomegaly)
Teach patient/family:
• To report immediately weakness, change in vision, impaired speech
• To use reliable contraception (pregnancy D); to avoid breastfeeding

brimonidine (ophthalmic)

(bri-moe'ni-deen)

Alphagan P

Func. class.: Antiglaucoma
Chem. class.: Selective alpha-2 agonist

Do not confuse:
brimonidine/bimatoprost

ACTION: Decrease aqueous humor and increase outflows

USES: Treatment of chronic open-angle glaucoma and ocular hypertension

CONTRAINDICATIONS: Hypersensitivity, AV block, heart failure, bradycardia, sick sinus syndrome, within 14 days of MAOIs therapy
Precautions: Breastfeeding, depression, cerebrovascular disease, hepatic/renal impairment, Raynaud's phenomenon, orthostatic hypotension, thromboangiitis obliterans

DOSAGE AND ROUTES

• **Adult/child >2 yr:** Instill 1 drop in the affected eye(s) tid
Available forms: Ophthalmic solution 0.1%, 0.15%, 0.2%

SIDE EFFECTS

CNS: Headache, dizziness, somnolence
CV: Hyper/hypotension
EENT: Eye stinging/burning, tearing, photophobia, change in vision, sinus infection

PHARMACOKINETICS

Peak ½-2 hr, half-life 2 hr

INTERACTIONS

Increase: intraocular pressure reduction—apraclonidine, dorzolamide, pilocarpine, timolol
Increase: effects of—CNS depressants
Decrease: B/P—beta blockers, antihypertensives
Decrease: brimonidine effect—tricyclic antidepressants, may cause HTN crisis MAOIs, linezolid

NURSING CONSIDERATIONS

Assess:
• Glaucoma: Monitor intraocular pressure
Evaluate:
• Decreasing intraocular pressure
Teach patient/family:
• That drug is for ophthalmic use only
• Not to touch the tip of the dropper to the eye, fingertips, or other surface to prevent contamination
• To wash hands before and after use. Tilt the head back slightly and pull the lower eyelid down with the index finger to form a pouch. Squeeze the prescribed number of drops into the pouch. Close eyes to spread drops. To avoid excessive systemic absorption, apply finger pressure on the lacrimal sac for 1–2 min following use
• That if more than one topical ophthalmic drug product is being used, the drugs should be administered at least 5 minutes apart
• To avoid contamination or the spread of infection, do not use dropper for more than one person

brinzolamide ophthalmic

See Appendix B

bromfenac (ophthalmic)

(brom'fen-ak)
Bromday
Func. class.: Antiinflammatory (ophthalmic)
Chem. class.: Nonsteroidal antiflammatory drug

ACTION: The mechanism of action is thought to be ability to block prostaglandin synthesis by inhibiting cyclooxygenase 1 and 2. In studies performed in animal eyes, prostaglandins have been shown to produce disruption of the blood–aqueous humor barrier, vasodilation, increased vascular permeability, leukocytosis, and increased intraocular pressure

USES: To reduce pain and inflammation after cataract surgery

CONTRAINDICATIONS: Hypersensitivity to this product, sulfites, NSAIDs, salicylates
Precautions: Bleeding disorders, complicated ocular surgery, corneal denervation, diabetes mellitus, rheumatoid ar-

thritis, dry eye syndrome, pregnancy (C), breastfeeding
Do not administer while wearing contact lenses

DOSAGE AND ROUTES

• **Adult:** Instill 1 drop (0.09 mg) into affected eye twice daily beginning 24 hr before cataract surgery, continued on the day of surgery and through the first 14 days of the postoperative period
Available forms: Ophthalmic solution 0.09%
Administer
• Apply topically to the eye
• Remove contact lenses before instilling solution. Contact lenses should not be worn during use of this product.
• Instruct patient on proper instillation of eye solution
• Do not touch the tip of the dropper to the eye, fingertips, or other surface
• Do not share bottle with other patients
• If more than one ophthalmic medication is being used, the medications should be administered at least 5 min apart

SIDE EFFECTS

CNS: Headache
EENT: Abnormal sensation in eye, conjunctival hyperemia, ocular irritation, ocular pain, ocular pruritus, conjunctival hyperemia, iritis, keratitis

PHARMACOKINETICS

Unknown

INTERACTIONS

Increase: corneal erosion, poor healing—topical corticosteroids
Increase: bleeding—anticoagulants

NURSING CONSIDERATIONS

Assess:
Eyes:
• For pain, inflammation, burning, redness after cataract surgery
• Identify if patient is using topical corticosteroids, anticoagulants, use cautiously in those using these products
Evaluate:
• Decreased pain and inflammation after cataract surgery
Teach patient/family:
• To apply topically to the eye
• To remove contact lenses before instilling solution; contact lenses should not be worn during use of this product
• Proper instillation of eye solution
• Not to touch the tip of the dropper to the eye, fingertips, or other surface
• Not to share bottle with other patients
• That if more than one ophthalmic medication is being used, the medications should be administered at least 5 minutes apart

B

bromocriptine (Rx)

(broe-moe-krip'teen)

Cycloset, Parlodel

Func. class.: Dopamine receptor agonist, antiparkinson agent
Chem. class.: Ergot alkaloid derivative

Do not confuse:
Parlodel/pindolol/Provera
bromocriptine/benztropine/brimonidine

ACTION: Inhibits prolactin release by activating postsynaptic dopamine receptors; activation of striatal dopamine receptors may be reason for improvement in Parkinson's disease

USES: Parkinson's disease, amenorrhea/galactorrhea caused by hyperprolactinemia, infertility, acromegaly, pituitary adenomas, adjunct for type 2 diabetes
Unlabeled uses: Neuroleptic malignant syndrome, alcoholism, premenstrual syndrome, mastalgia, cocaine withdrawal, premenstrual breast symptoms

CONTRAINDICATIONS:

Severe ischemic disease, uncontrolled hypertension, severe peripheral vascular disease; hypersensitivity to ergot, bromocriptine; migraine, preeclampsia

Precautions: Pregnancy (B), breastfeeding, children, renal/hepatic disease, pituitary tumors, peptic ulcer disease, sulfite hypersensitivity, pulmonary fibrosis, dementia, GI bleeding, bipolar disorder

DOSAGE AND ROUTES

Hyperprolactinemia

• **Adult: PO** 1.25-2.5 mg with meals; may increase by 2.5 mg q3-7days, usual range 2.5-15 mg/day

Acromegaly

• **Adult: PO** 1.25-2.5 mg × 3 days at bedtime; may increase by 1.25-2.5 mg q3-7days; usual range 20-30 mg/day, max 100 mg/day

Parkinson's disease

• **Adult: PO** 1.25 mg bid with meals; may increase q2-4wk by 2.5 mg/day, max 100 mg/day; levodopa should be continued while bromocriptine is being instituted

Pituitary adenoma

• **Adult: PO** 1.25 mg bid-tid; may increase over several wk to 10-20 mg/day

Type 2 diabetes (Cycloset only)

• **Adult: PO** (initially) 0.8 mg daily in AM within 2 hr of waking; titrate by 0.8 mg/day no more than weekly to max 1.6-4.8 mg/day

Neuroleptic malignant syndrome (unlabeled)

• **Adult: PO** 2.5-10 mg tid

Cocaine withdrawal (unlabeled)

• **Adult: PO** 0.625 mg qid × 42 days

Alcoholism (unlabeled)

• **Adult: PO** 7.5 mg/day

Mastalgia (unlabeled)

• **Adult: PO** 2.5-7.5 bid starting 10-14 days before menses; discontinue when menses begins

Available forms: Caps 5 mg; tabs 2.5 mg; Cycloset tabs 0.8 mg

Administer:

• With meal to prevent GI symptoms

• At bedtime so that dizziness, orthostatic hypotension do not occur

SIDE EFFECTS

CNS: *Headache,* depression, restlessness, anxiety, nervousness, confusion, seizures, *hallucinations,* dizziness, fatigue, drowsiness, abnormal involuntary movements, psychosis

CV: Orthostatic hypotension, decreased B/P, palpitations, extrasystole, shock, dysrhythmias, bradycardia, MI

EENT: Blurred vision, diplopia, burning eyes, nasal congestion

GI: *Nausea, vomiting, anorexia,* cramps, constipation, diarrhea, dry mouth, GI hemorrhage

GU: Frequency, retention, incontinence, diuresis

INTEG: *Rash on face, arms;* alopecia; coolness, pallor of fingers, toes; peripheral edema

PHARMACOKINETICS

Peak 1-3 hr, duration 4-8 hr, 90%-96% protein bound, half-life 3 hr, metabolized by liver (inactive metabolites), 85%-98% of dose excreted in feces, >90% of absorbed dose undergoes 1st-pass metabolism

INTERACTIONS

• Disulfiram-like reaction: alcohol

Increase: action of antihypertensives, levodopa, chloramphenicol, probenecid, salicylates, sulfonamides

Decrease: action of bromocriptine—phenothiazines, oral contraceptives, progestins, estrogens, haloperidol, loxapine, methyldopa, metoclopramide, MAOIs, reserpine

Decrease/increase: effect of Cycloset-CYP3A4 inhibitors/inducers

Decrease: effect of Cycloset-butyrophenones, metoclopramide, phenothiazine, thioxanthenes

Drug/Lab Test
Increase: growth hormone, AST, ALT, CK, BUN, uric acid, alk phos

NURSING CONSIDERATIONS

Assess:
• B/P; establish baseline, compare with other readings; this product decreases B/P and causes orthostatic hypotension
• **Parkinson's symptoms:** pill rolling, shuffling gait, restlessness, tremors, postural instability before and during treatment
• **Neuroleptic malignant syndrome:** decreased temp, seizures, sweating, pulse indicates resolution of symptoms
• Change in size of soft-tissue volume with acromegaly
• **Pregnancy:** may cause postpartum conception, use pregnancy testing q4wk or if menstruation does not occur
Perform/provide:
• Storage at room temp in tight, light-resistant container
Evaluate:
• Therapeutic response (Parkinson's disease): decreased dyskinesia, slow movements, drooling
Teach patient/family:
• That tabs may be crushed, mixed with food; Cyclosert to be taken within 2 hr of rising
• To change position slowly to prevent orthostatic hypotension
• To use contraceptives during treatment with this product; that pregnancy may occur; to use methods other than oral contraceptives/subdermal implants
• That therapeutic effect for Parkinson's disease may take 2 mo
• To avoid hazardous activity if dizziness occurs
• To report symptoms of MI immediately
• To take with food, avoid alcohol

budesonide (Rx)

(byoo-des'oh-nide)
Entocort EC, Pulmicort, Pulmicort Flexhaler, Rhinocort Aqua
Func. class.: Glucocorticoid
Chem. class.: Nonhalogenated

B

ACTION: Prevents inflammation by depressing migration of polymorphonuclear leukocytes and fibroblasts, reversal of increased capillary permeability, and lysosomal stabilization; does not suppress hypothalamus or pituitary function

USES: Rhinitis; prophylaxis for asthma; Crohn's disease
Unlabeled uses: Microscopic colitis

CONTRAINDICATIONS: Hypersensitivity, status asthmaticus
Precautions: Pregnancy (C), inhaled form (B); breastfeeding; children; TB; fungal, bacterial, systemic viral infections; ocular herpes simplex; nasal septal ulcers; hepatic disease (caps)

DOSAGE AND ROUTES

Rhinitis (Rhinocort Aqua)
• **Adult and child >12 yr: SPRAY/INH** 256 mcg/day (2 sprays in each nostril AM, PM or 4 sprays in each nostril AM)
Asthma
• **Adult: INH** 360 mcg bid, max 720 mcg bid
Crohn's disease
• **Adult: PO** 9 mg/day AM × 8 wk
Available forms: Dry powder for INH 90, 180, 200 mcg/actuation (Pulmicort Flexhaler); 32 mcg/actuation (Rhinocort Aqua) nasal spray; susp for INH 0.5 mg/2 ml, 0.25 mg/2 ml; cap 3 mg
Administer:
PO route (Crohn's disease)
• Swallow caps whole; do not break, crush, chew
• May repeat 8-wk course if needed; may taper to 6 mg/day for 2 wk before cessation

SIDE EFFECTS

CNS: *Headache,* insomnia, hypertonia, syncope, dizziness, drowsiness
CV: Chest pain, hypertension, sinus tachycardia, palpitation
EENT: *Sinusitis, pharyngitis,* rhinitis, oral candidiasis
ENDO: Adrenal insufficiency, growth suppression in children
GI: Dry mouth, dyspepsia, nausea, vomiting, abdominal pain
MISC: Ecchymosis, fever, *hypersensitivity,* flulike symptoms, epistaxis, dysuria
MS: Back pain, myalgias, fractures
RESP: Nasal irritation, cough, nasal bleeding, *respiratory infections,* bronchospasm

PHARMACOKINETICS

Peak: Respules 4-6 wk, Rhinocort Aqua 2 wk, half-life 2-3.6 hr
Onset: Respules 2-8 days, Rhinocort Aqua 10 hr
Enters breast milk

INTERACTIONS

Increase: budesonide effect, CYP3A inhibitors, dose adjustment may be needed
• Avoid concurrent use of varicella live vaccine in pediatric patients

NURSING CONSIDERATIONS

Assess:
• Respiratory status: rate, rhythm, increase in bronchial secretions, wheezing, chest tightness; provide fluids to 2 L/day to decrease thickness of secretions; check for oral candidiasis
• **Bronchospasm:** stop treatment, give bronchodilator
• Viral infections: corticosteroid use can mask infections
• Increased intraocular pressure: discontinue use if this occurs
Perform/provide:
• Storage at 59° F-86° F (15° C-30° C); keep away from heat, open flame
Evaluate:
• Therapeutic response: absence of asthma, rhinitis
Teach patient/family:
• To notify prescriber of pharyngitis, nasal bleeding, oral candidiasis
• Not to exceed recommended dose because adrenal suppression may occur
• To carry emergency ID that identifies steroid use
• To read and follow package directions
• To prevent exposure to infections (especially viral)
• To use good oral hygiene if using nebulizer or inhaler
• To avoid breastfeeding
• That burning or stinging may occur with first few doses of inhalation use
• That product is not a bronchodilator and not to be used for asthma; to use regularly
• Teach how to use as described in "administer"
• To notify prescriber if symptoms persist after wks, that results usually take 2 wk
• To notify prescriber if exposure to measles, chickenpox occurs

budesonide nasal agent

See Appendix B

bumetanide (Rx)

(byoo-met'a-nide)
Func. class.: Loop diuretic, antihypertensive
Chem. class.: Sulfonamide derivative

ACTION: Acts on ascending loop of Henle by inhibiting reabsorption of chloride, sodium

USES: Edema in CHF, renal/hepatic disease, heart failure
Unlabeled uses: Hypercalcemia, hypertension, ascites

CONTRAINDICATIONS: Hypersensitivity to sulfonamides, anuria, hepatic coma

Black Box Warning: Electrolyte imbalance

Precautions: Pregnancy (C), breastfeeding, neonates, ascites, severe renal disease, hepatic cirrhosis, blood dyscrasias, ototoxicity, hyperuricemia, hypokalemia, hyperglycemia, oliguria, hypomagnesemia, hypovolemia

Black Box Warning: Dehydration

DOSAGE AND ROUTES

- **Adult and adolescent: PO** 0.5-2.0 mg/day; may give 2nd or 3rd dose at 4-5 hr intervals, max 10 mg/day; may be given on alternate days or intermittently; **IV/IM** 0.5-1.0 mg; may give 2nd or 3rd dose at 2-3 hr intervals, not to exceed 10 mg/day
- **Child and infant (unlabeled): PO/IM/IV** 0.015-0.1 mg/kg daily or every other day, max 10 mg/day

Hypercalcemia (unlabeled)

- **Adult: IV** 1-2 mg q1-4hr to maintain urine output of 200-250 ml/hr; give saline before 1st dose of this product

Hypertension (unlabeled)

- **Adult and adolescent: PO** 0.5-2 mg/day, max 10 mg/day in 2 divided doses

Available forms: Tabs 0.5, 1, 2 mg; inj 0.25 mg/ml

Administer:

- In AM to avoid interference with sleep if using product as a diuretic; without regard to meals
- Potassium replacement if potassium is ≤3.0

PO route

- With food if nausea occurs; absorption may be decreased slightly

IV, direct route

- Direct IV undiluted slowly over 1-2 min through Y-tube, 3-way stopcock, or heplock

Intermittent IV INF route

- Dilute in LR, D_5W, 0.9% NaCl (rarely given by this method), give over 12 hr with renal disease

Syringe compatibilities: Doxapram

Y-site compatibilities: Acyclovir, alfentanil, allopurinol, amifostine, amikacin, aminocaproic acid, aminophylline, amiodarone, amoxicillin, amphotericin B lipid complex (Abelcet), amphotericin B liposome (AmBisome), anidulafungin, ascorbic acid injection, atenolol, atracurium, atropine, aztreonam, benztropine, bivalirudin, bleomycin, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, caspofungin, cefamandole, ceFAZolin, cefepime, cefmetazole, cefonicid, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, ceftAZidime, ceftizoxime, ceftobiprole, ceftRIAXone, cefuroxime, cephalothin, cephapirin, chloramphenicol, cimetidine, cisatracurium, CISplatin, cladribine, clarithromycin, clindamycin, codeine, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, dexmedetomidine, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, doripenem, doxacurium, DOXOrubicin, doxycycline, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, epoetin alfa, eptifibatide, ertapenem, erythromycin, esmolol, etoposide, famotidine, fentaNYL, filgrastim, fluconazole, fludarabine, fluorouracil, folic acid, furosemide, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, heparin, hydrocortisone sodium succinate, HYDROmorphone, hydrOXYzine, IDArubicin, ifosfamide, imipenem-cilastatin, indomethacin, insulin (regular), irinotecan, isoproterenol, ketorolac, labetalol, levofloxacin, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, melphalan, meperidine, metaraminol, methotrexate, methoxamine, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, mezlocillin, micafungin, miconazole, milrinone, mitoXANtrone, morphine, moxalactam, multiple vitamins injection, mycophenolate, nafcillin, nalbuphine, naloxone, netilmicin, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxacillin, oxaliplatin, oxytocin, palonosetron, pamidronate, pan-

curonium, pantoprazole, PEMEtrexed, penicillin G potassium/sodium, pentazocine, PENTobarbital, PHENobarbital, phenylephrine, phytonadione, piperacillin, piperacillin-tazobactam, polymyxin B, potassium chloride, procainamide, promethazine, propofol, propranolol, protamine, pyridoxine, quiNIDine, ranitidine, remifentanil, rifampin, ritodrine, riTUXimab, rocuronium, sodium acetate, sodium bicarbonate, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiamine, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, TNA, tobramycin, tolazoline, TPN, traMADol, trastuzumab, trimetaphan, urokinase, vancomycin, vasopressin, vecuronium, verapamil, vinCRIStine, vinorelbine, voriconazole

SIDE EFFECTS

CNS: *Headache,* fatigue, weakness, *dizziness,* encephalopathy
CV: Chest pain, *hypotension,* circulatory collapse, ECG changes, dehydration
EENT: *Loss of hearing*
ELECT: *Hypokalemia, hypochloremic alkalosis, hypomagnesemia, hyperuricemia, hypocalcemia, hyponatremia*
ENDO: *Hyperglycemia*
GI: *Nausea,* diarrhea, dry mouth, vomiting, anorexia, cramps, upset stomach, abdominal pain, acute pancreatitis, jaundice
GU: *Polyuria,* renal failure, glycosuria, premature ejaculation, hypercholesterolemia
HEMA: Thrombocytopenia, leukopenia, granulocytopenia, hemoconcentration
INTEG: *Rash, pruritus,* purpura, Stevens-Johnson syndrome, sweating, photosensitivity
MS: Muscular cramps, arthritis, stiffness

PHARMACOKINETICS

Excreted by kidneys (50% unchanged), feces (20%); crosses placenta; excreted in breast milk; protein binding >96%; half-life 1-1½ hr, 6-15 hr in neonates

PO: Onset ½-1 hr, peak 1-2 hr, duration 3-6 hr
IM: Onset 40 min, peak 1-2 hr, duration 4-6 hr
IV: Onset 5 min, peak 15-30 min, duration 3-6 hr

INTERACTIONS

- Ototoxicity: aminoglycosides
- Hypokalemia: potassium-wasting products

Increase: toxicity—lithium, digoxin
Increase: diuresis, electrolyte loss—metolazone
Decrease: diuretic effect—indomethacin, NSAIDs, probenecid
Decrease: antidiabetic effects—antidiabetics

Drug/Herb

Increase: effect—hawthorn, horse chestnut
Decrease: effect of bumetanide—ginseng, ephedra

NURSING CONSIDERATIONS

Assess:

- For tinnitus; obtain audiometric testing for long-term IV treatment
- Weight, I&O daily to determine fluid loss; if urinary output decreases or azotemia occurs, product should be discontinued; safest dosage schedule is alternate days
- B/P lying, standing; postural hypotension may occur

Black Box Warning: Electrolyte imbalances: Potassium, sodium, calcium; include BUN, blood glucose, CBC, serum creatinine, blood pH, ABGs, uric acid, calcium, magnesium; severe electrolyte imbalances should be corrected before starting treatment

- Blood glucose if patient is diabetic; blood uric acid levels in those with gout
- Improvement in edema of feet, legs, sacral area daily if medication is being used for CHF
- Signs of metabolic alkalosis: drowsiness, restlessness

• **Hypokalemia:** postural hypotension, malaise, fatigue, tachycardia, leg cramps, weakness
• Rashes, temp elevation daily
• Confusion, especially in geriatric patients; take safety precautions if needed
• **Digoxin toxicity** in patients taking digoxin products: anorexia, nausea, vomiting, confusion, paresthesia, muscle cramps; **lithium toxicity** in those taking lithium

Evaluate:
• Therapeutic response: decreased edema, B/P

Teach patient/family:
• To increase fluid intake to 2-3 L/day unless contraindicated; to take potassium supplement; to rise slowly from lying or sitting position
• To recognize adverse reactions: muscle cramps, weakness, nausea, dizziness
• To take with food, milk for GI symptoms; to avoid alcohol
• To take early in day to prevent nocturia
• To use sunscreen to prevent photosensitivity

TREATMENT OF OVERDOSE:

Lavage if taken orally; monitor electrolytes; administer dextrose in saline; monitor hydration, CV, renal status

buprenorphine (Rx)

(byoo-pre-nor'feen)

Buprenex, Butrans

Func. class.: Opioid analgesic, partial agonist

Chem. class.: Thebaine derivative

Controlled Substance Schedule V (Parenteral); Schedule III (Tablet, TD)

Do not confuse:
Buprenex/Bumex

ACTION:

Depresses pain impulse transmission at the spinal cord level by interacting with opioid receptors

USES:

Moderate to severe pain, opiate agonist withdrawal

Unlabeled uses: Cocaine withdrawal

CONTRAINDICATIONS:

Hypersensitivity, ileus

Black Box Warning: Respiratory depression

Precautions: Pregnancy (C), breastfeeding, substance abuse/alcoholism, increased intracranial pressure, MI (acute), severe heart disease, respiratory depression, renal/hepatic/pulmonary disease, hypothyroidism, Addison's disease

Black Box Warning: QT prolongation, use of heating pad, accidental exposure, potential for overdose/poisoning, substance abuse

DOSAGE AND ROUTES

• **Adult: IM/IV** 0.3 mg q6hr prn, reduce dosage in geriatric patients, may repeat after 30-60 min; **EPIDURAL** (unlabeled) 4 mcg/kg or 2 mcg/kg (epidural inj); **TD** each patch is worn for 7 days (moderate-severe pain); **opioid-naive patients** (those taking <30 mg of oral morphine or equivalent before beginning treatment with TD buprenorphine), 5 mcg/hr q7days, overestimating dose can be fatal; **conversion from other opiate agonist therapy,** titrate from other opioids for up to 7 days to no more than 30 mg oral morphine or equivalent before beginning TD therapy, begin with 5 mcg/hr q7days; for those with daily dose of 30-80 mg oral morphine or equivalent, start with 10 mcg/hr q7days; for those taking >80 mg oral morphine or equivalent, start with 20 mcg/hr q7days
• **Child 2-12 yr: IM/IV** 2-6 mcg/kg q4-6hr

Available forms: Inj 0.3 mg/ml (1-ml vials); SL tab 2, 8 mg as base; TD system 5, 10, 20 mcg/hr (weekly)

Administer:

SL route
• Do not chew, dissolve under tongue, take 2 or more at same time

Transdermal route
- Apply to clean, dry, intact skin; each patch should be worn for 7 days; do not apply direct heat source to patch, will increase absorption of product
- Apply to upper outer arm, upper chest/back, or side of chest

IM route
- In deep muscle mass

IV, direct route
- **Give** undiluted over ≥2 min, titrate to patient response
- With antiemetic if nausea, vomiting occur
- When pain is beginning to return; determine dosage interval by patient response

Additive compatibilities: Bupivacaine, glycopyrrolate, haloperidol

Syringe compatibilities: Glycopyrrolate, haloperidol, heparin, midazolam

Y-site compatibilities: Acyclovir, alfentanil, allopurinol, amifostine, amikacin, aminocaproic acid, amphotericin B liposome (AmBisone), anidulafungin, ascorbic acid injection, atenolol, atracurium, atropine, aztreonam, benztropine, bivalirudin, bleomycin, bumetanide, butorphanol, calcium chloride/gluconate, CARBOplatin, cefamandole, ceFAZolin, cefepime, cefmetazole, cefonicid, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, ceftAZidime, ceftizoxime, ceftRIAXone, cefuroxime, cephalothin, cephapirin, chloramphenicol, chlorproMAZINE, cimetidine, cisatracurium, CISplatin, cladribine, clindamycin, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, D_5W-dextrose 5%, DACTINomycin, DAPTOmycin, dexamethasone, dexmedetomidine, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, doxacurium, DOXOrubicin HCl, doxycycline, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, epoetin alfa, eptifibatide, ertapenem, erythromycin, esmolol, etoposide, famotidine, fenoldopam, fentaNYL, filgrastim, fluconazole, fludarabine, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, heparin, hydrocortisone, hydrOXYzine, IDArubicin, ifosfamide, imipenem-cilastatin, inamrinone, insulin (regular), irinotecan, isoproterenol, ketorolac, labetalol, lactated Ringer's injection, levofloxacin, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, melphalan, meperidine, metaraminol, methicillin, methotrexate, methoxamine, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, mezlocillin, miconazole, midazolam, milrinone, minocycline, mitoXANtrone, morphine, moxalactam, multiple vitamins injection, mycophenolate mofetil, nafcillin, nalbuphine, naloxone, nesiritide, netilmicin, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxacillin, oxaliplatin, oxytocin, palonosetron, pamidronate, pancuronium, papaverine, PEMEtrexed, penicillin G potassium/sodium, pentamidine, pentazocine, phenylephrine, phytonadione, piperacillin, piperacillin-tazobactam, polymyxin B, potassium chloride, procainamide, prochlorperazine, promethazine, propofol, propranolol, protamine, pyridoxine, quiNIDine, ranitidine, remifentanil, Ringer's injection, ritodrine, riTUXimab, rocuronium, sodium acetate, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiamine, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, TNA (3-in-1), tobramycin, tolazoline, TPN, trastuzumab, trimetaphan, urokinase, vancomycin, vasopressin, vecuronium, verapamil, vinCRIStine, vinorelbine, voriconazole

SIDE EFFECTS

CNS: *Drowsiness, dizziness, confusion, headache, sedation, euphoria,* increased intracranial pressure, amnesia

CV: Palpitations, bradycardia, change in B/P, tachycardia

EENT: Tinnitus, blurred vision, *miosis,* diplopia

GI: *Nausea,* vomiting, anorexia, constipation, cramps, dry mouth

GU: Dysuria, urinary retention
INTEG: *Rash,* urticaria, bruising, flushing, diaphoresis, pruritus
RESP: Respiratory depression, dyspnea, hypo/hyperventilation

PHARMACOKINETICS

Metabolized in liver by CYP3A4, excreted by kidneys and in feces, crosses placenta, excreted in breast milk, half-life $2^1/_2$-$3^1/_2$ hr, 96% bound to plasma proteins
IM: Onset 15 min, peak $^1/_2$ hr, duration 6 hr
SL: Onset, peak, duration unknown, half-life 37 hr
IV: Onset 1 min, peak 5 min, duration 6 hr, half-life 2.2 hr

INTERACTIONS

Increase: effect with other CNS depressants—alcohol, opioids, sedative/hypnotics, antipsychotics, skeletal muscle relaxants, MAOIs
Increase: buprenorphine effect—CYP3A4 inhibitors (erythromycin, indinavir, ketoconazole, ritonavir, saquinavir)
Increase: QT prolongation—class IA, III antidysrhythmics
Decrease: buprenorphine effect—CYP3A4 inducers (carBAMazepine, PHENobarbital, phenytoin, rifampin)
Drug/Herb
Increase: CNS depression—St. John's wort

NURSING CONSIDERATIONS

Assess:
• **Pain:** intensity, location, type before treatment, after 5 min (IV); need for pain medication, tolerance
• I&O ratio; check for decreasing output, may indicate urinary retention
• Bowel pattern; severe constipation can occur
• CNS changes, dizziness, drowsiness, hallucinations, euphoria, LOC, pupil reaction; withdrawal in opioid-dependent persons; if dependence occurs, within 2 wk of discontinuing product **withdrawal symptoms** will occur
• Allergic reactions: rash, urticaria
• Respiratory dysfunction: respiratory depression, character, rate, rhythm; notify prescriber if respirations are <12/min

Black Box Warning: Potential for overdose may occur from chewing, swallowing, snorting, or injecting extracted product from TD formulation

Black Box Warning: **QT prolongation:** in those taking class Ia, III antidysrhythmics; patients with hypokalemia, cardiac instability (TD), max TD 20 mcg/hr q7day

Evaluate:
• Therapeutic response: decrease in pain, absence of grimacing
Teach patient/family:
• To report any symptoms of CNS changes, allergic reactions

Black Box Warning: That psychologic dependence leading to substance abuse may result when used for extended periods; that long-term use not recommended

• To avoid hazardous activities such as driving unless reaction known

TREATMENT OF OVERDOSE:

Naloxone 0.4 mg ampule diluted in 10 ml 0.9% NaCl given by direct IV push 0.02 mg q2min (adult)

buPROPion (Rx)

(byoo-proe'pee-on)
Aplenzin, Budeprion SR, Budeprion XL, Buproban, Wellbutrin, Wellbutrin SR, Wellbutrin XL, Zyban
Func. class.: Antidepressant—miscellaneous smoking deterrent
Chem. class.: Aminoketone

Do not confuse:
buPROPion/busPIRone
Zyban/Diovan/Zagam

ACTION: Inhibits reuptake of DOPamine, norepinephrine, serotonin

USES: Depression (Wellbutrin), smoking cessation (Zyban); seasonal affective disorder
Unlabeled uses: Neuropathic pain, enhancement of weight loss, ADHD (attention-deficit/hyperactivity disorder)

CONTRAINDICATIONS: Hypersensitivity, eating disorders, seizure disorders
Precautions: Pregnancy (C), breastfeeding, geriatric patients, renal/hepatic disease, recent MI, cranial trauma, seizure disorder

Black Box Warning: Children <18 yr, suicidal thinking/behavior (young adults)

DOSAGE AND ROUTES

Depression
• **Adult: PO** 100 mg bid initially then increase after 3 days to 100 mg tid if needed, max 150 mg single dose; **ER/SR** initially 150 mg AM, increase to 300 mg/day if initial dose is tolerated, after no less than 4 days; after several wk, titrate to 200 mg bid; Aplenzin 174 mg q AM, may increase to 348 mg q AM on day 4, may increase to 522 mg after several weeks if needed
• **Geriatric: PO** 50-100 mg/day, may increase by 50-100 mg q3-4days
Smoking cessation (Zyban)
• **Adult: SR** 150 mg q day × 3 days then 150 mg bid for remainder of treatment, initiate 1-2 wk before targeted "quit day," continue for 7-12 wk; in combination with nicotine TD, 150 mg q day × 3 days then 150 mg bid for remainder of treatment, give ≥8 hr apart, max 300 mg/day, initiate 1-2 wk before targeted "quit day," continue for 7-12 wk, may be continued for 8-20 wk
ADHD (unlabeled) (Wellbutrin)
• **Adult: PO** 100 mg bid, after ≥3 days titrate to 100 mg tid; SR 300 mg/day, 200 mg 8 AM, 100 mg 4 PM
Diabetic neuropathy/postherpetic neuralgia (unlabeled)(Wellbutrin SR)
• **Adult: PO** SR 150-300 mg/day

Available forms: Tabs 75, 100 mg; sus rel tabs (SR) 150; ext rel tab (XL) 100, 150, 300 mg; (SR-12 hr, XL-24 hr); tab ext rel (Aplenzin) 174, 348, 522 mg
Administer:
PO route
⚠ When switching to Aplenzin from Wellbutrin, Wellbutrin SR or XL, use these equivalents: 174 mg buPROPion HBr = 150 mg buPROPion HCl; 348 mg buPROPion HBr = 300 mg buPROPion HCl; 522 mg buPROPion HBr = 450 mg buPROPion HCl
• **Wellbutrin immediate rel,** separate by ≥6 hr, give in 3 divided doses; **Wellbutrin SR,** if multiple doses are used, separate by ≥8 hr; **Wellbutrin XL,** give daily in AM; **Zyban SR,** give in 2 divided doses, ≥8 hr apart; **Aplenzin ER,** give daily in AM, a larger dose of Aplenzin is needed because these products are not equivalent
• Do not break, crush, chew sus rel, ext rel tab
• At evenly spaced times to prevent seizures; seizure risk increases with high doses
• Increase fluids, bulk in diet if constipation occurs
• With food, milk for GI symptoms
• Sugarless gum, hard candy, frequent sips of water for dry mouth
• Avoid giving at night to prevent insomnia

SIDE EFFECTS

CNS: *Headache, agitation, dizziness, akinesia, bradykinesia, confusion,* seizures, delusions, *insomnia, sedation, tremors,* suicidal ideation
CV: *Dysrhythmias, hypertension,* palpitations, *tachycardia,* hypotension, complete AV block; QRS prolongation (overdose)
EENT: *Blurred vision, auditory disturbance*
GI: *Nausea, vomiting,* anorexia, diarrhea, *dry mouth,* increased appetite, *constipation,* altered taste
GU: Impotence, urinary frequency, retention, *menstrual irregularities*

INTEG: *Rash,* pruritus, *sweating,* Stevens-Johnson syndrome
MISC: *Weight loss or gain*

PHARMACOKINETICS

Onset 2-4 wk, half-life 14 hr, extensively metabolized by liver, some conversion to active metabolites, steady state 5-8 days, protein binding 84%, excreted in urine and feces

INTERACTIONS

Increase: adverse reactions, seizures—levodopa, MAOIs, phenothiazines, antidepressants, benzodiazepines, alcohol, theophylline, systemic steroids
Increase: buPROPion toxicity—ritonavir
Increase: buPROPion level—cimetidine
Increase: buPROPion effect—CYP2D6/CYP2B6 inhibitors
Decrease: effect of tamoxifen
Decrease: buPROPion effect—carBAMazepine, cimetidine, PHENobarbital, phenytoin or other products (CYP2D6); CYP2B6 inducers
Drug/Herb
Increase: CNS depression—kava, valerian

NURSING CONSIDERATIONS

Assess:
• Hepatic/renal function in patients with hepatic, kidney impairment
• For increased risk of seizures; if patient has excessively used CNS depressants and OTC stimulants, dosage of buPROPion should not be exceeded
• For smoking cessation after 7-12 wk; if progress has not been made, product should be discontinued

Black Box Warning: Mental status: mood, sensorium, affect, suicidal tendencies, increase in psychiatric symptoms

Perform/provide:
• Assistance with ambulation during beginning therapy because sedation occurs
• Safety measures, primarily for geriatric patients

Evaluate:
• Therapeutic response: decreased depression, ability to perform daily activities, ability to sleep throughout the night, smoking cessation

Teach patient/family:
• That therapeutic effects may take 2-4 wk; not to increase dose without prescriber's approval; that treatment for smoking cessation lasts 7-12 wk
• To use caution when driving, performing other activities that require alertness; sedation, blurred vision may occur
• To avoid alcohol, other CNS depressants; alcohol may increase risk of seizures
• Not to use with nicotine patches unless directed by prescriber; may increase B/P
• To notify prescriber immediately if urinary retention occurs
• That risk of seizures increased when dose exceeded, if patient has seizure disorder

Black Box Warning: That suicidal ideas, behaviors, hostility, depression may occur in children or young adults

• To notify prescriber if pregnancy is suspected, planned

TREATMENT OF OVERDOSE:

ECG monitoring; lavage, activated charcoal; administer anticonvulsant

busPIRone (Rx)

(byoo-spye'rone)
BuSpar, BuSpar Dividose
Func. class.: Antianxiety, sedative
Chem. class.: Azaspirodecanedione

Do not confuse:
busPIRone/buPROPion

ACTION: Acts by inhibiting the action of serotonin (5-HT); has shown little potential for abuse; a good choice with substance abuse

USES: Management and short-term relief of generalized anxiety disorders
Unlabeled uses: Autism

CONTRAINDICATIONS:

Children <18 yr, hypersensitivity

Precautions: Pregnancy (B), breastfeeding, geriatric patients, impaired hepatic/renal function

DOSAGE AND ROUTES

• **Adult: PO** 7.5 mg bid; may increase by 5 mg/day q2-3days, max 60 mg/day

Autism with anxiety (unlabeled)

• **Adult: PO** 5-15 mg tid after titration, max 60 mg/day

• **Child ≥5 yr: PO** 0.2-0.6 mg/kg/day, max 60 mg/day; titrate to higher dose

Hepatic/renal dose

• **Adult: PO** reduce by 25%-50% for mild-moderate hepatic disease; do not use for severe hepatic disease; CCr 11-70 ml/min reduce by 25%-50%, CCr <10 ml/min do not use

Available forms: Tabs 5, 7.5, 10, 15, 30 mg

Administer:

• With food, milk for GI symptoms; avoid grapefruit juice; give drug at same time of day, with/without food consistently

• Crushed if patient unable to swallow medication whole

• Sugarless gum, hard candy, frequent sips of water for dry mouth

SIDE EFFECTS

CNS: *Dizziness, headache, depression, stimulation, insomnia, nervousness, lightheadedness, numbness, paresthesia, incoordination,* nightmares, *tremors,* excitement, involuntary movements, confusion, akathisia, hostility

CV: *Tachycardia, palpitations,* hypo/hypertension, CVA, CHF, MI

EENT: *Sore throat, tinnitus, blurred vision, nasal congestion;* red, itching eyes; change in taste, smell

GI: *Nausea, dry mouth, diarrhea, constipation,* flatulence, increased appetite, rectal bleeding

GU: Frequency, hesitancy, menstrual irregularity, change in libido

INTEG: *Rash,* edema, pruritus, alopecia, dry skin

MISC: *Sweating,* fatigue, weight gain, fever, serotonin syndrome

MS: *Pain, weakness,* muscle cramps, spasms

RESP: Hyperventilation, chest congestion, shortness of breath

PHARMACOKINETICS

Peak 40-90 min, half-life 2-3 hr, rapidly absorbed, metabolized by liver (CYP3A4), excreted in feces, protein binding 86%

INTERACTIONS

Increase: busPIRone—product metabolized by CYP3A4 (erythromycin, itraconazole, nefazodone, ketoconazole, ritonavir, several other protease inhibitors)

Increase: B/P—procarbazine, MAOIs; do not use together

Increase: CNS depression—psychotropic products, alcohol (avoid use)

Increase: serotonin syndrome—SSRIs, SNRIs, serotonin receptor agonists

Decrease: busPIRone effects—rifampin

Decrease: busPIRone action—products induced by CYP3A4 (rifampin, phenytoin, PHENobarbital, carBAMazepine, dexamethasone)

Drug/Food

Increase: peak concentration of busPIRone—grapefruit juice

NURSING CONSIDERATIONS

Assess:

• B/P lying, standing; pulse; if systolic B/P drops 20 mm Hg, hold product, notify prescriber

• CNS reactions because some may be unpredictable

• Mental status: mood, sensorium, affect, sleeping pattern, drowsiness, dizziness; withdrawal symptoms when dose reduced, product discontinued

Perform/provide:

• Safety measures if drowsiness, dizziness occurs

Evaluate:

• Therapeutic response: decreased anxiety, restlessness, sleeplessness

Teach patient/family:
- That product may be taken consistently with/without food
- To avoid OTC preparations, alcohol ingestion, other psychotropic medications unless approved by prescriber; to avoid large amounts of grapefruit juice
- To avoid activities that require alertness because drowsiness may occur
- Not to discontinue medication abruptly after long-term use; if dose missed, do not double
- To rise slowly because fainting may occur, especially among geriatric patients
- That drowsiness may worsen at beginning of treatment; that 1-2 wk of therapy may be required before therapeutic effects occur
- Serotonin syndrome: to report immediately (fever, tremor, sweating, diarrhea, delirium)

⚠ HIGH ALERT

busulfan (Rx)

(byoo-sul'fan)

Busulfex, Myleran

Func. class.: Antineoplastic alkylating agent

Chem. class.: Bifunctional alkylating agent

Do not confuse:
Myleran/Leukeran

ACTION: Changes essential cellular ions to covalent bonding with resultant alkylation; this interferes with the normal biological function of DNA; activity is not phase-specific; action is due to myelosuppression

USES: Chronic myelocytic leukemia, bone marrow ablation, stem cell transplant preparation with CML

CONTRAINDICATIONS: Pregnancy (D) 3rd trimester, breastfeeding, radiation, chemotherapy, blastic phase of chronic myelocytic leukemia, hypersensitivity

Precautions: Women of childbearing age, leukopenia, anemia, hepatotoxicity, renal toxicity, seizures, tumor lysis syndrome, hyperkalemia, hyperphosphatemia, hypocalcemia, hyperuricemia

Black Box Warning: Thrombocytopenia, neutropenia, secondary malignancy

DOSAGE AND ROUTES

Chronic myelocytic leukemia
- **Adult: PO** 4-8 mg/day or 1.8-4 mg/m²/day initially, reduce dose if WBC reaches 30,000-40,000/mm³, discontinue if WBC ≤20,000/mm³, maintenance 1-3 mg/day
- **Child: PO** 0.06-0.12 mg/kg/day or 1.8-4.6 mg/m²/day; reduce if WBC reaches 30,000-40,000/mm³, discontinue if WBC ≤20,000/mm³

Allogenic hemopoietic stem cell transplantation with chronic myelogenous leukemia
- **Adult: IV** 0.8 mg/kg over 2 hr, q6hr × 4 days (total 16 doses); give cyclophosphamide **IV** 60 mg/kg over 1 hr daily for 2 days starting after 16th dose of busulfan; **PO** (unlabeled) 1 mg/kg q6hr × 16 doses
- **Adolescent and child (unlabeled) >12 kg: IV** 0.8 mg/kg over 2 hr q6hr × 16 doses (4 days) then high-dose cyclophosphamide 50 mg/kg/day × 4 days
- **Infant/child ≤12 kg (unlabeled): IV** 1.1 mg/kg over 2 hr q6hr × 16 doses (4 days) then high-dose cyclophosphamide 50 mg/kg/day × 4 days

Available forms: Tabs 2 mg; inj 6 mg/ml

Administer:

PO route
- Give at same time daily on empty stomach

Intermittent IV INF route
- Prepare in biologic cabinet while wearing gloves, gown, mask; **dilute** with 10 times volume of product with D_5W, 0.9% NaCl, (0.5 mg/ml); when withdrawing product, use needle with 5-micron

filter provided, remove amount needed, remove filter, and **inject** product into diluent; always add product to diluent (not vice versa); stable for 8 hr at room temp (using D_5W) or 12 hr refrigerated; **give** by central venous catheter over 2 hr q6hr × 4 days, use inf pump, do not admix

- Give antiemetics before IV route on schedule
- In those with history of seizures, give phenytoin before IV drug to prevent seizures (using 0.9% NaCl)

Y-site compatibilities: Acyclovir, amphotericin B lipid complex, amphotericin B liposome, anidulafungin, atenolol, bivalirudin, bleomycin, caspofungin, codeine, DAPTOmycin, dexmedetomidine, diltiazem, DOCEtaxel, ertapenem, fenoldopam, gatifloxacin, granisetron, HYDROmorphone, levofloxacin, linezolid, LORazepam, meperidine, metroNIDAZOLE, milrinone, nesiritide, octreotide acetate, ondansetron, palonosetron, pancuronium, piperacillin-tazobactam, riTUXimab, sodium acetate, tacrolimus, tigecycline, tirofiban, trastuzumab, vasopressin

SIDE EFFECTS

PO route

CV: *Hypotension,* thrombosis, *chest pain,* tachycardia, atrial fibrillation, heart block, pericardial effusion, cardiac tamponade (high dose with cyclophosphamide)

GI: *Anorexia, constipation, diarrhea, dry mouth, nausea, vomiting*

RESP: Alveolar hemorrhage, atelectasis, cough, hemoptysis, hypoxia, pleural effusion, pneumonia, sinusitis, pulmonary fibrosis

IV route

CNS: Cerebral hemorrhage, coma, seizures, *anxiety, depression, dizziness, headache,* encephalopathy, *weakness,* mental changes

EENT: *Pharyngitis, epistaxis,* cataracts

GI: Nausea, vomiting, *diarrhea, weight loss*

GU: Impotence, sterility, amenorrhea, gynecomastia, renal toxicity, hyperuremia, adrenal-insufficiency–like syndrome

HEMA: Thrombocytopenia, leukopenia, pancytopenia, severe bone marrow depression

INTEG: Dermatitis, hyperpigmentation, alopecia

OTHER: Chromosomal aberrations

RESP: Irreversible pulmonary fibrosis, pneumonitis

PHARMACOKINETICS

Well absorbed orally, excreted in urine, crosses placenta, excreted in breast milk, half-life 2.5 hr

INTERACTIONS

Increase: hepatotoxicity—thioguanine

Increase: cardiac tamponade—cyclophosphamide

Increase: toxicity—other antineoplastics, radiation

Increase: risk for bleeding—anticoagulants, salicylates

Increase: antibody response—live virus vaccines

Decrease: busulfan level—phenytoin

Decrease: busulfan clearance—acetaminophen, itraconazole

Drug/Lab Test

False positive: breast, bladder, cervix, lung cytology tests

NURSING CONSIDERATIONS

Assess:

Black Box Warning: CBC, differential, platelet count weekly; withhold product if WBC is $<15{,}000/mm^3$ or platelet count is $<150{,}000/mm^3$; notify prescriber of results; institute thrombocytopenia precautions; levels for withholding product will be different for children

Black Box Warning: Bone marrow status before chemotherapy; seizure history; bone marrow suppression may be prolonged (up to 2 mo)

• **Pulmonary fibrosis:** pulmonary function tests, chest x-ray films before, during therapy; chest film should be obtained q2wk during treatment; pulmonary fibrosis may occur up to 10 yr after treatment with busulfan
• Renal studies: BUN, serum uric acid, urine CCr before, during therapy; monitor ALT, alk phos, bilirubin, uric acid before and during treatment; I&O ratio; report fall in urine output of <30 ml/hr; hyperuricemia

Black Box Warning: For secondary malignancy within 5-8 yr of chronic oral therapy, long-term follow-up may be required

• Monitor for cold, fever, sore throat (may indicate beginning infection)
• Bleeding: hematuria, guaiac, bruising, petechiae; mucosa, orifices q8hr; no rectal temps
• Dyspnea, crackles, nonproductive cough, chest pain, tachypnea
• Inflammation of mucosa, breaks in skin; use viscous xylocaine for oral pain

Perform/provide:
• Comprehensive oral hygiene
• Strict medical asepsis, protective isolation if WBC levels low
• Increased fluid intake to 2-3 L/day to prevent urate deposits, calculi formation
• Storage in tight container

Evaluate:
• Therapeutic response: decreased exacerbations of chronic myelocytic leukemia

Teach patient/family:
• To avoid use of products that contain aspirin, ibuprofen; razors; commercial mouthwash
• To use effective contraception during and for at least 3 mo after treatment; to avoid breastfeeding; may cause infertility, discuss family planning before initiating therapy, pregnancy (D)
• To report signs of **anemia** (fatigue, headache, irritability, faintness, shortness of breath); symptoms of **infection;** jaundice; persistent cough, congestion, skin pigmentation, darkening of skin; sudden weakness, weight loss (may resemble adrenal insufficiency)
• To report symptoms of bleeding (hematuria, tarry stools)
• To avoid vaccinations, crowds, persons with known infections
• That impotence, amenorrhea can occur; that these are reversible after discontinuing treatment

B

butoconazole vaginal antifungal

See Appendix B

butorphanol (Rx)

(byoo-tor'fa-nole)

Func. class.: Opioid analgesic
Chem. class.: Mixed opioid antagonist, partial agonist

Controlled Substance Schedule IV

ACTION: Depresses pain impulse transmission at the spinal cord level by interacting with opioid receptors

USES: Moderate to severe pain, general anesthesia induction/maintenance, headache, migraine, preanesthesia
Unlabeled uses: Pruritus

CONTRAINDICATIONS: Hypersensitivity to product, preservative; addiction (opioid)
Precautions: Pregnancy (C), breastfeeding, children <18 yr, addictive personality, increased intracranial pressure, respiratory depression, renal/hepatic disease, bowel impaction, CHF, MI

DOSAGE AND ROUTES

Moderate-severe pain
• **Adult: IM** 1-4 mg q3-4hr prn; **IV** 0.5-2 mg q3-4hr prn; **INTRANASAL** 1 spray in 1 nostril, may give another dose 1-1½ hr

later; repeat if needed 3-4hr after last dose

• **Geriatric: IV** ½ adult dose at 2× the interval; **INTRANASAL** if no relief after 90-120 min, may repeat with 1 spray

Renal/hepatic dose

• **Adult: INTRANASAL** max 1 mg followed by 1 mg after 90-120 min; **IM/IV** give 50% of dose (0.5 mg **IV**, 1 mg **IM**), do not repeat within 6 hr

Opioid-induced pruritus (unlabeled)

• **Adult: INTRANASAL** 1 mg (1 spray) in each nostril q4-6hr

Intractable pruritus with inflammatory skin or systemic disease (unlabeled)

• **Adult: INTRANASAL** 1-4 mg/day

Available forms: Inj 1, 2 mg/ml; nasal spray 10 mg/ml

Administer:

• With antiemetic if nausea, vomiting occur

• When pain beginning to return; determine dosage interval according to patient response

Nasal route

• Prime before first use, point sprayer away from the face, pump activator 7 times until a fine, wide spray occurs if not used for 48 hr, reprime by pumping 1-2 ×

• If more than 1 spray is needed, use other nostril

• Do not share with others

• Nasal congestion/irritation may occur

IM route

• Deeply in large muscle mass

IV direct route

• Undiluted at a rate of <2 mg/>3-5 min, titrate to patient response; inject directly in vein or tubing of free-flowing compatible IV inf

Syringe compatibilities: Atropine, chlorproMAZINE, cimetidine, diphenhydrAMINE, droperidol, fentaNYL, hydrOXYzine, meperidine, methotrimeprazine, metoclopramide, midazolam, morphine, pentazocine, perphenazine, prochlorperazine, promethazine, scopolamine, thiethylperazine

Y-site compatibilities: Acyclovir, alfentanil, allopurinol, amifostine, amikacin, aminocaproic acid, aminophylline, amphotericin B liposome (AmBisome), anidulafungin, ascorbic acid injection, atenolol, atracurium, atropine, aztreonam, benztropine, bivalirudin, bleomycin, bumetanide, buprenorphine, calcium chloride/gluconate, CARBOplatin, caspofungin, cefamandole, ceFAZolin, cefepime, cefmetazole, cefonicid, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, cefTAZidime, ceftizoxime, ceftRIAXone, cefuroxime, cephalothin, chlorproMAZINE, cimetidine, cisatracurium, CISplatin, cladribine, clindamycin, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone phosphate, dexmedetomidine, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, doxacurium, DOXOrubicin, DOXOrubicin liposomal, doxycycline, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, epoetin alfa, eptifibatide, ertapenem, erythromycin, esmolol, etoposide, famotidine, fenoldopam, fentaNYL, filgrastim, fluconazole, fludarabine, fluorouracil, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, heparin, hydrocortisone, hydrOXYzine, IDArubicin, ifosfamide, imipenem-cilastatin, irinotecan, isoproterenol, ketorolac, labetalol, lactated Ringer's injection, levofloxacin, lidocaine, linezolid injection, LORazepam, magnesium, mannitol, mechlorethamine, melphalan, meperidine, metaraminol, methicillin, methotrexate, methoxamine, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, mezlocillin, miconazole, milrinone, minocycline, mitoXANtrone, morphine, moxalactam, multiple vitamins injection, mycophenolate mofetil, nafcillin, nalbuphine, naloxone, nesiritide, netilmicin, niCARdipine, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxacillin, oxaliplatin, oxytocin, palonosetron, pamidronate, pancuronium, papaverine, PEMEtrexed,

penicillin G potassium/sodium, pentazocine, PHENobarbital, phenylephrine, phytonadione, piperacillin, piperacillin-tazobactam, polymyxin B, potassium chloride, procainamide, prochlorperazine, promethazine, propofol, propranolol, protamine, pyridoxine, quiNIDine, ranitidine, remifentanil, Ringer's injection, ritodrine, riTUXimab, rocuronium, sargramostim, sodium acetate, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiamine, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, TNA, tobramycin, tolazoline, TPN, trastuzumab, trimetaphan, urokinase, vancomycin, vasopressin, vecuronium, verapamil, vinCRIStine, vinorelbine, voriconazole

SIDE EFFECTS

CNS: *Drowsiness, dizziness, confusion, headache, sedation, euphoria, weakness, hallucinations,* insomnia (nasal)

CV: Palpitations, bradycardia, hypotension

EENT: Tinnitus, blurred vision, miosis, diplopia, nasal congestion, unpleasant taste

GI: *Nausea, vomiting, anorexia, constipation, cramps*

GU: Dysuria, urinary retention

INTEG: Rash, urticaria, bruising, flushing, diaphoresis, pruritus

RESP: Respiratory depression, URI, sinusitis

PHARMACOKINETICS

Metabolized by liver, excreted by kidneys, crosses placenta, excreted in breast milk, half-life 2-9 hr, protein binding 80%

IM: Onset 5-15 min, peak 30-60 min, duration 3-4 hr

INTRANASAL: Onset within 15 min, peak 1-2 hr, duration 4-5 hr

IV: Onset 1 min, peak 4-5 min, duration 2-4 hr

INTERACTIONS

⚠ **Increase:** Severe, fatal reactions: MAOIs

Increase: CNS effects—alcohol, opioids, sedative/hypnotics, antipsychotics, skeletal muscle relaxants, other CNS depressants

NURSING CONSIDERATIONS

Assess:

- For decreasing output; may indicate urinary retention
- ⚠ For withdrawal symptoms in opioid-dependent patients; PE, vascular occlusion, abscesses, ulcerations
- CNS changes: dizziness, drowsiness, hallucinations, euphoria, LOC, pupil reaction
- Allergic reactions: rash, urticaria
- Respiratory dysfunction: respiratory depression, character, rate, rhythm; notify prescriber if respirations are <10/min
- Need for pain medication, physical dependence

Perform/provide:

- Storage in light-resistant container at room temp
- Safety measures: night-light, call bell within easy reach, assistance with ambulation, especially for geriatric patients

Evaluate:

- Therapeutic response: decrease in pain

Teach patient/family:

- To report any symptoms of CNS changes, allergic reactions
- That physical dependency may result when used for extended periods
- That withdrawal symptoms may occur: nausea, vomiting, cramps, fever, faintness, anorexia
- How to use nasal product
- To avoid hazardous activities

TREATMENT OF OVERDOSE:

Naloxone HCl (Narcan) 0.2-0.8 mg IV, O_2, IV fluids, vasopressors

calcitonin (rDNA) (Rx)

(kal-sih-toh'nin)

Fortical

calcitonin (salmon) (Rx)

Miacalcin

Func. class.: Parathyroid agents (calcium regulator)

Chem. class.: Polypeptide hormone

ACTION: Decreases bone resorption, blood calcium levels; increases deposits of calcium in bones; opposes parathyroid hormone

USES: Paget's disease, postmenopausal osteoporosis, hypercalcemia

Unlabeled uses: Bone/neuropathic pain, diabetic neuropathy, osteolytic metastases, osteoporosis prophylaxis, phantom limb pain

CONTRAINDICATIONS: Hypersensitivity to this product, fish

Precautions: Pregnancy (C), breastfeeding, children, renal disease, osteogenic sarcoma, pernicious anemia

DOSAGE AND ROUTES

rDNA

Paget's disease

• **Adult: SUBCUT** 0.5 mg/day initially; may require 0.5 mg bid × 6 mo, then decrease until symptoms reappear

Salmon

Postmenopausal osteoporosis

• **Adult: SUBCUT/IM** 100 international units every other day; **INTRANASAL** 200 international units (1 spray) daily alternating nostrils daily, activate pump before 1st dose

Paget's disease

• **Adult: SUBCUT/IM** 100 international units/day, maintenance 50 international units daily, every other day or 3 × per wk

Hypercalcemia

• **Adult: SUBCUT/IM** 4 international units/kg q12hr, increase to 8 international units/kg q12hr if response is unsatisfactory

Neuropathic pain/phantom limb pain/diabetic neuropathy (unlabeled)

• **Adult: IV/SUBCUT** 100-200 international units/day for phantom limb pain **IV** 200 international units over 20 min and 2nd inf given

Bone pain due to osteoporosis, osteolytic metastases (unlabeled)

• **Adult: SUBCUT** 50-100 international units/day or **INTRANASAL** 200 international units in 1 nostril/day

Available forms: Inj 200 international units/ml; nasal spray 200 international units/actuation

Administer:

SUBCUT route (rDNA)

• By SUBCUT route only; rotate inj sites; use within 6 hr of reconstitution; **give** at bedtime to minimize nausea, vomiting, rotate sites

IM route (Salmon)

• After test dose of 10 international units/ml, 0.1 ml intradermally; watch for 15 min; **give** only with epinephrine, emergency meds available

• IM inj slowly into deep muscle mass; rotate sites; preferred route if volume is >2 ml

SIDE EFFECTS

CNS: Headache, tetany, chills, weakness, dizziness, fever, tremors

CV: Chest pressure

EENT: Nasal congestion, eye pain

GI: Nausea, diarrhea, vomiting, anorexia, abdominal pain, salty taste, epigastric pain

GU: Diuresis, nocturia, urine sediment, frequency

INTEG: Rash, flushing, pruritus of earlobes, edema of feet, reaction at inj site

MS: Swelling, tingling of hands, backache

RESP: Dyspnea

SYST: Anaphylaxis

PHARMACOKINETICS

IM/SUBCUT: Onset 15 min, peak 4 hr, duration 8-24 hr, metabolized by kidneys, excreted as inactive metabolites via kidneys

INTERACTIONS

Decrease: lithium effect
Decrease: effect of nasal spray—biphosphonates (Paget's disease)

NURSING CONSIDERATIONS

Assess:
• **Anaphylaxis, hypersensitivity reaction** (rash, fever, inability to breathe); emergency equipment should be nearby
• GI symptoms, polyuria, flushing, head swelling, tingling, headache; may indicate hypercalcemia
• Nutritional status; diet for sources of vit D (milk, some seafood), calcium (dairy products, dark green vegetables), phosphates
• Urinalysis (calcium should be kept at 9-10 mg/dl, vit D 50-135 international units/dl), alk phos baseline, q3-6mo; monitor urine hydroproline with Paget's disease, biochemical markers of bone formation/absorption, radiologic evidence of fracture; bone density (osteoporosis)
• **Toxicity (can occur rapidly),** increased drug level; have parenteral calcium on hand if calcium level drops too low; check for tetany (irritability, paresthesia, nervousness, muscle twitching, seizures, tetanic spasms)

Perform/provide:
• Storage at <77° F (25° C); protect from light

Evaluate:
• Therapeutic response: calcium levels 9-10 mg/dl, decreasing symptoms of Paget's disease

Teach patient/family:
• About the method of inj if patient will be responsible for self-medication
• To report difficulty swallowing, any changes in side effects to prescriber immediately

Nasal

• To use alternating nostrils for nasal spray; use after allowing to warm to room temp; prime to get full spray

C

calcitriol vitamin D_3 (Rx)

(kal-sih-try'ole)
Calcijex, Rocaltrol, Vectical
Func. class.: Parathyroid agent (calcium regulator)
Chem. class.: Vit D hormone

Do not confuse:
calcitriol/Calciferol

ACTION: Increases intestinal absorption of calcium, provides calcium for bones, increases renal tubular resorption of phosphate

USES: Hypocalcemia with chronic renal disease, hyperparathyroidism pseudohypoparathyroidism
Unlabeled uses: Osteopetrosis, osteoporosis, osteoporosis prophylaxis, rickets, familial hypophosphatemia

CONTRAINDICATIONS: Hypersensitivity, hyperphosphatemia, hypercalcemia, vit D toxicity
Precautions: Pregnancy (C), breastfeeding, renal calculi, CV disease

DOSAGE AND ROUTES

Hypocalcemia (stage 5 chronic kidney disease, on dialysis)
• **Adult and child ≥6 yr: PO** 0.25 mcg/day **IV** 0.5 mcg tid initially; may increase by 0.25 every other day q4-8wk
• **Child 1-5 yr: PO** 0.25-2 mcg/day

Renal osteodystrophy
• **Adult and child ≥3 yr: PO** 0.25 mcg/day, may increase to 0.5 mcg/day
• **Child <3 yr: PO** 0.01-0.015 mcg/kg/day

Hypoparathyroidism
• **Adult and child ≥6 yr: PO** 0.25 mcg/day, may increase q2-4wk, maintenance 0.5-2 mcg/day

- **Child 1-5 yr: PO** 0.25-0.75 mcg daily
- **Child <1 yr: PO** 0.04-0.08 mcg/kg/day

Rickets (unlabeled)

- **Adult and child: PO** 1 mcg/day

Familial hypophosphatemia (unlabeled)

- **Adult: PO** 2 mcg/day
- **Child: PO** 0.015-0.02 mcg/kg/day, maintenance 0.03-0.06 mcg/kg/day; max 2 mcg/day

Postmenopausal osteoporosis (unlabeled)

- **Adult: PO** 0.25 mcg bid, adjust to serum calcium levels

Osteopetrosis (unlabeled)

- **Child: PO** high-dose calcitriol 1-2 mcg/kg/day given in 4-6 divided doses

Osteoporosis prophylaxis in corticosteroid therapy (unlabeled)

- **Adult: PO** 0.5-1 mcg/day

Available forms: Caps 0.25, 0.5 mcg; inj 1 mcg/ml, 2 mcg/ml; oral sol 1 mcg/ml; top 3 mcg/g

Administer:

PO route

- Do not break, crush, chew caps
- Give without regard to meals

IV route

- Give by direct IV over 1 min

SIDE EFFECTS

CNS: Drowsiness, headache, vertigo, fever, lethargy, hallucinations
CV: Palpitations, hypertension
EENT: Blurred vision, photophobia
GI: Nausea, diarrhea, vomiting, jaundice, anorexia, dry mouth, constipation, cramps, metallic taste
GU: Polyuria, hypercalciuria, hyperphosphatemia, hematuria, thirst
MS: Myalgia, arthralgia, decreased bone development, weakness
SYST: Anaphylaxis

PHARMACOKINETICS

PO: Absorbed readily from GI tract, peak 10-12 hr, duration 3-5 days, half-life 3-6 hr, undergoes hepatic recycling, excreted in bile

INTERACTIONS

- Hypercalcemia: thiazide diuretics, calcium supplements
- Cardiac dysrhythmias: cardiac glycosides, verapamil
- Hypermagnesemia: magnesium antacids
- Toxicity: other vit D products

Increase: metabolism of vit D—phenytoin
Decrease: absorption of calcitriol—cholestyramine, mineral oil, fat-soluble vitamins

Drug/Food

- Large amounts of high-calcium foods may cause hypercalcemia

Drug/Lab Test

False increase: cholesterol
Interference: alk phos, electrolytes

NURSING CONSIDERATIONS

Assess:

- BUN, urinary calcium, PTH, creatinine, chloride, magnesium, electrolytes, phosphate; may increase calcium; should be kept at 9-10 mg/dl, vit D 50-135 international units/dl, phosphate 70 mg/dl; toxic reactions may occur rapidly
- **Hypercalcemia:** dry mouth, metallic taste, polyuria, bone pain, muscle weakness, headache, fatigue, change in level of consciousness, dysrhythmias, increased respirations, anorexia, nausea, vomiting, cramps, diarrhea, constipation; paresthesia, twitching, dysrhythmias, Chvostek's sign, Trousseau's sign **(hypocalcemia)**
- Renal status: decreased urinary output (oliguria, anuria), edema in extremities, weight gain 5-7 lb, periorbital edema
- Nutritional status, diet for sources of vit D (milk, some seafood); calcium (dairy products, dark green vegetables), phosphates (dairy products) must be avoided

Perform/provide:
• Storage protected from light, heat, moisture
• Restriction of sodium, potassium if required; restriction of fluids if required for chronic renal failure
Evaluate:
• Therapeutic response: calcium 9-10 mg/dl; decreasing symptoms of hypocalcemia, hypoparathyroidism
Teach patient/family:
• About symptoms of hypercalcemia: renal stones, nausea, vomiting, anorexia, lethargy, thirst, bone or flank pain
• To avoid products with sodium: cured meats, dairy products, cold cuts, olives, beets, pickles, soups, meat tenderizers with chronic renal failure; products with potassium: oranges, bananas, dried fruit, peas, dark green leafy vegetables, milk, melons, beans
• To avoid OTC products that contain calcium, potassium, sodium with chronic renal failure
• To monitor weight weekly; to maintain fluid intake

calcium carbonate (PO-OTC)

AcidFree, Alka-Mints, Amitone, Apo-Cal ✤, Calcarb, Calci-Chew, Calci-Mix, Calcite ✤, Cal-Gest, Caltrate, Equaline Calcium, Leader Calcium, Maalox Antacid, Os-Cal 500, Rolaids Extra Strength Softchew, Tums, Tums E-X, Walgreens Calcium

calcium acetate (OTC)

(kal'see-um ass'e-tate)

Calphron, Eliphos, PhosLo

Func. class.: Antacid, calcium supplement

Chem. class.: Calcium product

Do not confuse:
Os-Cal/Asacol

ACTION: Neutralizes gastric acidity

USES: Antacid, calcium supplement; not suitable for chronic therapy, hyperphosphatemia, hypertension during pregnancy, osteoporosis, prevention, treatment of hypocalcemia, hypoparathyroidism

Unlabeled uses: Duodenal ulcer, PMS, stress gastritis

CONTRAINDICATIONS: Hypersensitivity, hypercalcemia, hyperparathyroidism, bone tumors

Precautions: Pregnancy (C), breastfeeding, geriatric patients, fluid restriction, decreased GI motility, GI obstruction, dehydration, renal disease

DOSAGE AND ROUTES

Nutritional supplement including osteoporosis prophylaxis

• **Adult ≥51 yr: PO** 1000-1500 mg/day elemental calcium (2500-3750 mg/day calcium carbonate)
• **Adult 19-50 yr: PO** 1000 mg/day elemental calcium (2500 mg/day calcium carbonate)

Chronic hypocalcemia

• **Adult: PO** 2-4 g/day elemental calcium (5-10 g/day calcium carbonate) in 3-4 divided doses
• **Child: PO** 45-65 mg/kg/day elemental calcium (112.5-162.5 mg/kg/day calcium carbonate) in 4 divided doses
• **Neonate: PO** 50-150 mg/kg/day elemental calcium (125-375 mg/kg/day in 4-6 divided doses, max 1 g/day)

Supplementation

• **Adolescent and child 9-18 yr: PO** 1300 mg elemental calcium (3250 mg calcium carbonate)
• **Child 4-8 yr: PO** 800 mg/day elemental calcium (2000 mg/day calcium carbonate)
• **Child 1-3 yr: PO** 500 mg/day elemental calcium (1250 mg/day calcium carbonate)
• **Infant 6-12 mo: PO** 270 mg/day elemental calcium based on total intake
• **Neonates and infants <6 mo: PO** 210 mg/day elemental calcium based on total intake

Hyperphosphatemia

• **Adult: PO** Individualized on response

Heartburn, dyspepsia, hyperacidity (OTC)

• **Adult: PO** 1-2 tabs q2hr, max 9 tabs/24 hr (Alka-mints); chew 2-4 tab q1hr prn, max 16 tabs (Tums regular strength); chew 2-4 tab q1hr prn, max 10 tabs (Tums E-X); chew 2-3 tabs q1hr prn, max 10 tabs/24 hr (Tums Ultra); chew 2 tabs q2-3hr, max 19 tabs/24 hr (Titralac Extra Strength)

Duodenal ulcer/stress gastritis (unlabeled)

• **Adult: PO** 80-140 mEq q1-3hr

PMS (unlabeled)

• **Adult: PO** (Tums EX, Tums Calcium for Life PMS) Chew 2 tabs bid

Available forms: Calcium carbonate: chewable tabs 350, 420, 450, 500, 750, 1000, 1250 mg; tabs 500, 600, 650, 667, 1000, 1250, 1500 mg; gum 300, 450, 500 mg; susp 1250 mg/5 ml; caps 1250 mg; powder 6.5 g/packet; **calcium acetate:** tabs 250 mg (65 mg Ca), 667 mg (169 mg Ca), 668 mg (169 mg Ca), 1 g (250 mg Ca); caps 500 mg (125 mg Ca)

Administer:

PO route

• Do not give enteric-coated within 1 hr of calcium carbonate

• For ulcer treatment (adjunct): give 1 and 3 hr after meals and at bedtime

• For a phosphate binder: give 1 hr after each meal or snack and at bedtime

• For supplement: give 1-1½ hr after meals; avoid oxalic acid foods (spinach, rhubarb), phytic acid (brans, cereals) or phosphorus (milk, dairy), may decrease calcium absorption

• Suspension: shake well, use calibrated measuring device

• Laxatives or stool softeners if constipation occurs

SIDE EFFECTS

GI: *Constipation,* anorexia, nausea, vomiting, flatulence, diarrhea, rebound hyperacidity, eructation

GU: Calculi, hypercalciuria

PHARMACOKINETICS

⅓ of dose absorbed by small intestine, onset 20 min, duration 20-180 min, excreted in feces and urine, crosses placenta, must have adequate vit D for absorption

INTERACTIONS

Increase: digoxin toxicity—hypercalcemia

Increase: plasma levels of quiNIDine, amphetamines

Increase: hypercalcemia—thiazide diuretics

Decrease: levels of salicylates, calcium channel blockers, ketoconazole, iron salts, tetracyclines, fluoroquinolones, phenytoin, etidronate, risedronate, atenolol

Drug/Lab Test

False increase: chloride

False positive: benzodiazepines

False decrease: magnesium, oxylate, lipase

NURSING CONSIDERATIONS

Assess:

• Calcium (serum, urine), calcium should be 8.5-10.5 mg/dl, urine calcium should be 150 mg/day, monitor weekly; serum phosphate

⚠ **Milk-alkali syndrome:** nausea, vomiting, disorientation, headache

• Constipation; increase bulk in the diet if needed

• **Hypercalcemia:** headache, nausea, vomiting, confusion; hypocalcemia: paresthesia, twitching colic, dysrhythmias, Chvostek's sign, Trousseau's sign

• Those taking digoxin for toxicity

• Antacid—for abdominal pain, heartburn, indigestion before, after administration

Evaluate:

• Therapeutic response: absence of pain, decreased acidity; decreased hyperphosphatemia with renal failure

Teach patient/family:

• To increase fluids to 2 L unless contraindicated; to add bulk to diet for consti-

pation; to notify prescriber of constipation
• Not to switch antacids unless directed by prescriber; not to use as antacid for >2 wk without approval by prescriber
• That therapeutic dose recommendations are figured as elemental calcium
• To avoid excessive use of alcohol, caffeine, tobacco
• To avoid spinach, cereals, dairy products in large amounts

CALCIUM SALTS

calcium chloride (Rx)
calcium gluceptate (Rx)
calcium gluconate (Rx)
calcium lactate (Rx)
Func. class.: Electrolyte replacement—calcium product

ACTION: Caution needed for maintenance of nervous, muscular, skeletal function; enzyme reactions; normal cardiac contractility; coagulation of blood; affects secretory activity of endocrine, exocrine glands

USES: Prevention and treatment of hypocalcemia, hypermagnesemia, hypoparathyroidism, neonatal tetany, cardiac toxicity caused by hyperkalemia, lead colic, hyperphosphatemia, vit D deficiency, osteoporosis prophylaxis, calcium antagonist toxicity (calcium channel blocker toxicity)
Unlabeled uses: Electrolyte abnormalities in cardiac arrest, CPR

CONTRAINDICATIONS: Hypercalcemia, digoxin toxicity, ventricular fibrillation, renal calculi
Precautions: Pregnancy (C), breastfeeding, children, respiratory/renal disease, cor pulmonale, digitalized patient, respiratory failure, diarrhea, dehydration

DOSAGE AND ROUTES

Calcium chloride
• **Adult: IV** 500 mg-1 g q1-3days as indicated by serum calcium levels, give at <1 ml/min; **IV** 200-800 mg injected in ventricle of heart

Calcium gluceptate
• **Adult: IV** 5-20 ml; **IM** 2-5 ml

Calcium gluconate
• **Adult: PO** 0.5-2 g bid-qid; **IV** 0.5-2 g at 0.5 ml/min (10% solution); max **IV** dose 3 g
• **Child: PO/IV** 500 mg/kg/day in divided doses

Calcium lactate
• **Adult: PO** 325 mg-1.3 g tid with meals
• **Child: PO** 500 mg/kg/day in divided doses

Available forms: Many; check product listings
Administer:
PO route (only acetate, carbonate, citrate, glubionate, lactate, phosphate)
• Give in 3-4 divided doses with or 1 hr after meals, follow with full glass of water; if using as phosphate binder in renal dialysis, do not follow with water, do not give oral medications within 1 hr of oral calcium; *chew tab:* chew thoroughly; *effervescent tab:* dissolve in full glass of water; *oral powder:* mix and give with food; *oral solution:* give before meals; *oral suspension:* shake well
IM route
• Glycerophosphate, lactate may be given IM
• Do not give chloride, gluconate IM
• Use only if IV is not feasible
• Inject into gluteal region (adult), lateral thigh (child)
• Aspirate before inj
• Do not give chloride subcut
IV route
• Undiluted or diluted with equal amounts of NS to a 5% sol for inj, give 0.5-1 ml/min
• Through small-bore needle into large vein; if extravasation occurs, necrosis will result (IV)
• Remain recumbent 1/2 hr after IV dose

C

Canada only

Side effects: *italics* = common; **bold** = life-threatening

Calcium chloride

Additive compatibilities: Amikacin, amphotericin B, ampicillin, ascorbic acid, cefTRIAXone, cephapirin, chloramphenicol, DOPamine, hydrocortisone, isoproterenol, lidocaine, methicillin, norepinephrine, penicillin G potassium, penicillin G sodium, pentobarbital, PHENobarbital, verapamil, vit B/C

Syringe compatibilities: Milrinone

Y-site compatibilities: Inamrinone, DOBUTamine, EPINEPHrine, esmolol, morphine, PACLitaxel

Calcium gluceptate

Additive compatibilities: Ascorbic acid inj, isoproterenol, lidocaine, norepinephrine, phytonadione, sodium bicarbonate

Calcium gluconate

Additive compatibilities: Amikacin, aminophylline, ascorbic acid inj, cephapirin, chloramphenicol, cisatracurium, corticotropin, dimenhyDRINATE, DOXOrubicin liposome, erythromycin, furosemide, heparin, hydrocortisone, lidocaine, magnesium sulfate, methicillin, norepinephrine, penicillin G potassium, penicillin G sodium, PHENobarbital, potassium chloride, remifentanil, tobramycin, vancomycin, verapamil, vit B/C

Syringe compatibilities: Aldesleukin, allopurinol, amifostine, aztreonam, ceFAZolin, cefepime, ciprofloxacin, cladribine, DOBUTamine, enalaprilat, EPINEPHrine, famotidine, filgrastim, granisetron, heparin/hydrocortisone, labetalol, melphalan, midazolam, netilmicin, piperacillin/tazobactam, potassium chloride, prochlorperazine, propofol, sargramostim, tacrolimus, teniposide, thiotepa, tolazoline, vinorelbine, vit B/C

SIDE EFFECTS

CV: Shortened QT, heart block, hypotension, bradycardia, dysrhythmias; cardiac arrest (IV)

GI: Vomiting, nausea, constipation

HYPERCALCEMIA: Drowsiness, lethargy, muscle weakness, headache, constipation, coma, anorexia, nausea, vomiting, polyuria, thirst

INTEG: Pain, burning at IV site, severe venous thrombosis, necrosis, extravasation

PHARMACOKINETICS

Crosses placenta, enters breast milk, excreted via urine and feces, half-life unknown, protein binding 40%-50%

PO: Onset, peak, duration unknown, absorption from GI tract

IV: Onset immediate, duration ½-2 hr

INTERACTIONS

Increase: milk-alkali syndrome—antacids

Increase: dysrhythmias—digoxin glycosides

Increase: toxicity—verapamil

Increase: hypercalcemia—thiazide diuretics

Decrease: absorption of fluoroquinolones, tetracyclines, iron salts, phenytoin, thyroid hormones when calcium is taken PO

Decrease: effects of atenolol, verapamil

Drug/Herb

Increase: action/side effects—lily of the valley, pheasant's eye, shark cartilage, squill

Drug/Lab Test

Increase: calcium

NURSING CONSIDERATIONS

Assess:

- **ECG for decreased QT and T wave inversion:** hypercalcemia, product should be reduced or discontinued, consider cardiac monitoring
- Calcium levels during treatment (8.5-11.5 g/dl is normal level); urine calcium if hypercaluria occurs
- Cardiac status: rate, rhythm, CVP (PWP, PAWP if being monitored directly)
- **Hypocalcemia:** muscle twitching, paresthesia, dysrhythmias, laryngospasm
- Digitalized patients frequently; an increase in calcium increases digoxin toxicity risk

Perform/provide:
• Seizure precautions: padded side rails, decreased stimuli (noise, light); place airway suction equipment, padded mouth gag if calcium levels are low
• Store at room temp
Evaluate:
• Therapeutic response: decreased twitching, paresthesias, muscle spasms; absence of tremors, seizures, dysrhythmias, dyspnea, laryngospasm; negative Chvostek's sign, negative Trousseau's sign
Teach patient/family:
• To add foods high in vit D
• To add calcium-rich foods to diet: dairy products, shellfish, dark green leafy vegetables; to decrease oxalate- and zinc-rich foods: nuts, legumes, chocolate, spinach, soy
• To prevent injuries; to avoid immobilization

RARELY USED

calfactant (Rx)

(cal-fak'tant)

Infasurf

Func. class.: Natural lung surfactant extract

USES: Prevention and treatment (rescue) of respiratory distress syndrome in premature infants

DOSAGE AND ROUTES

• **Newborn: INTRATRACHEAL INSTILL:** 3 ml/kg of birth weight given as 2 doses of 1.5 ml/kg; repeat doses of 3 ml/kg of birth wt until up to 3 doses 12 hr apart have been given

candesartan (Rx)

(can-deh-sar'tan)

Atacand

Func. class.: Antihypertensive

Chem. class.: Angiotensin II receptor (type AT_1) antagonist

C

ACTION: Blocks the vasoconstrictor and aldosterone-secreting effects of angiotensin II; selectively blocks the binding of angiotensin II to the AT_1 receptor found in tissues

USES: Hypertension, alone or in combination; CHF NYHA Class II-IV and ejection fraction ≤40%

CONTRAINDICATIONS: Hypersensitivity

Black Box Warning: Pregnancy (D) 2nd/3rd trimesters

Precautions: Pregnancy (C) 1st trimester, breastfeeding, children, geriatric patients, hypersensitivity to ACE inhibitors, volume depletion, renal/hepatic impairment

DOSAGE AND ROUTES

Hypertension
• **Adult: PO** single agent 16 mg/day initially in patients who are not volume depleted, range 8-32 mg/day; with diuretic or volume depletion 2-32 mg/day as single dose or divided bid
• **Adolescent and child ≥6 yr and weight >50 kg: PO** 8-16 mg/day or divided bid, adjust to B/P; usual range 4-32 mg/day, max 32 mg/day
• **Child ≥6 yr, weight <50 kg: PO** 4-8 mg/day or divided bid, adjust to B/P
• **Child ≥1 yr and <6 yr: PO** 0.2 mg/kg/day in 1 dose or in 2 divided doses, adjust to B/P, max 0.4 mg/kg/day
Heart failure
• **Adult: PO** 4 mg/day, may be doubled ≥2 wk, target dose 32 mg/day

Renal/hepatic disease
• **Adult: PO** ≤8 mg/day for severe renal disease/moderate hepatic disease, adjust dose as needed
Available forms: Tabs 4, 8, 16, 32 mg
Administer:
• Without regard to meals
• Oral liquid: shake well, do not freeze

SIDE EFFECTS

CNS: *Dizziness,* fatigue, headache
CV: Chest pain, peripheral edema, hypotension
EENT: Sinusitis, rhinitis, pharyngitis
GI: *Diarrhea,* nausea, abdominal pain, vomiting
GU: Renal failure
MS: Arthralgia, pain
RESP: *Cough, upper respiratory infection*
SYST: Angioedema

PHARMACOKINETICS

Peak 3-4 hr, protein binding 99%, half-life 9-12 hr, extensively metabolized, excreted in urine (33%) and feces (67%)

INTERACTIONS

Increase: lithium level—lithium
Increase: hyperkalemia—potassium, potassium-sparing diuretics
Increase: hypotension—ACE inhibitors, β-blockers, calcium channel blockers, α-blockers
Decrease: effect—salicylates, NSAIDs
Drug/Herb
Increase: antihypertensive effect—hawthorn
Decrease: antihypertensive effect—ephedra

NURSING CONSIDERATIONS

Assess:
⚠ **Serious hypersensitivity reaction:** angioedema, anaphylaxis: facial swelling, difficulty breathing (rare)

Black Box Warning: For pregnancy; this product can cause fetal death when given during pregnancy (D), 2nd/3rd trimester

• Response and adverse reactions, especially with renal disease
• B/P, pulse q4hr; note rate, rhythm, quality; electrolytes: potassium, sodium, calcium; baselines of renal/hepatic studies before therapy begins
• **Heart failure:** jugular venous distention, weight, edema, dyspnea, crackles
Evaluate:
• Therapeutic response: decreased B/P
Teach patient/family:
• To comply with dosage schedule, even if feeling better
• To notify prescriber of mouth sores, fever, swelling of hands or feet, irregular heartbeat, chest pain
• That excessive perspiration, dehydration, vomiting, diarrhea may lead to fall in B/P; to consult prescriber if these occur
• To rise slowly to sitting or standing position to minimize orthostatic hypotension; that product may cause dizziness, fainting, lightheadedness

Black Box Warning: To notify prescriber immediately if pregnant; not to use if breastfeeding

• To avoid all OTC medications unless approved by prescriber; to inform all health care providers of medication use
• To use proper technique for obtaining B/P; to understand acceptable parameters

capecitabine (Rx)

(cap-eh-sit'ah-bean)

Xeloda

Func. class.: Antineoplastic, antimetabolite

Chem. class.: Fluoropyrimidine carbamate

Do not confuse:
Xeloda/Xenical

ACTION: Competes with physiologic substrate of DNA synthesis, thereby interfering with cell replication in the S phase of cell cycle (before mitosis); also inter-

fères with RNA and protein synthesis; product is converted to 5-FU

USES: Monotherapy for PACLitaxel; anthracycline-resistant, metastatic breast, colorectal cancer when 5-FU monotherapy is preferred; treatment of colorectal cancer patients who have undergone complete resection of their primary tumors

Unlabeled uses: Biliary tract, ovarian cancer

CONTRAINDICATIONS: Pregnancy (D), hypersensitivity to 5-FU, infants, severe renal impairment (CCr <30 ml/min), DPD deficiency

Precautions: Breastfeeding, children, geriatric patients, renal/hepatic disease

DOSAGE AND ROUTES

Metastatic breast cancer resistant to both PACLitaxel and anthracycline or resistant to PACLitaxel and when further anthracycline therapy is not indicated

• **Adult: PO** 2500 mg/m²/day divided q12hr after a meal × 2 wk, repeat q3wk

Breast cancer (locally advanced/metastatic) with DOCEtaxel, previously treated with anthracycline

• **Adult: PO** 2500 mg/m²/day divided q12hr after a meal on days 1-14, with docetaxel 75 mg/m² IV on day 1

Advanced/metastatic breast cancer (HER2 positive) previously treated with anthracycline, taxane, and trastuzumab

• **Adult: PO** 2000 mg/m²/day divided q12hr after a meal on days 1-14 with lapatinib 1250 mg/day on days 1-21, repeat q21days

Metastatic/locally advanced breast cancer resistant to anthracycline, previously treated with a taxane or taxane resistant, and when further anthracycline is contraindicated

• **Adult: PO** 2000 mg/m²/day divided q12hr on days 1-14 with ixabepilone 40 mg/m² IV over 3 hr, repeat q3wk

As an adjuvant for Dukes C colorectal cancer with a complete resection when fluoropyrimidine alone is preferred

• **Adult: PO** 2500 mg/m²/day divided q12hr within 30 min of a meal × 2 wk, repeat q3wk for 8 cycles

First-line treatment of metastatic colorectal cancer when fluoropyrimidine alone is preferred

• **Adult: PO** 2500 mg/m²/day divided q12hr after a meal × 2 wk, repeat q3wk

First-line treatment of metastatic colorectal cancer with oxaliplatin with or without bevacizumab (unlabeled)

• **Adult: PO** 2000 mg/m²/day divided q12hr after a meal on days 1-14 with oxaliplatin on day 1, repeat q3wk

First-/second-line treatment of advanced colorectal cancer with oxaliplatin (unlabeled)

• **Adult: PO** 2000 mg/m²/day divided q12hr on days 1-14 and oxaliplatin 130 mg/m² IV on day 1, repeat q3wk

Unresectable advanced/metastatic biliary tract cancer (unlabeled)

• **Adult: PO** 2500 mg/m² divided q12hr on days 1-14, then 7-day rest period; given with CISplatin 60 mg/m² IV over 1 hr on day 1, repeat q21days

Renal dose

• **Adult: PO** CCr 30-50 ml/min, decrease initial dose to 75% of usual dose; CCr <30 ml/min, contraindicated

Available forms: Tabs 150, 500 mg

Administer:

• **Dosage adjustments of capecitabine monotherapy based on most severe toxicity OR when used in combination with ixabepilone based on nonhematologic toxicity: Grade 1 toxicity:** maintain current dosage; **Grade 2 toxicity**

(1st appearance): interrupt therapy until toxicity is resolved to grade 0–1; do not replace missed doses, begin the next cycle with 100% of the starting dose; **Grade 2 toxicity (2nd appearance):** interrupt therapy until toxicity is resolved to grade 0–1; do not replace missed doses, begin the next cycle with 75% of the starting dose; **Grade 2 toxicity (3rd appearance):** interrupt therapy until toxicity is resolved to grade 0–1; do not replace missed doses, begin the next cycle with 50% of the starting dose; **Grade 2 toxicity (4th appearance):** discontinue treatment permanently; **Grade 3 toxicity (1st appearance):** interrupt therapy until toxicity is resolved to grade 0–1

SIDE EFFECTS

CNS: Dizziness, *headache, paresthesia, fatigue,* insomnia
CV: Venous thrombosis
GI: *Nausea, vomiting, anorexia, diarrhea, stomatitis, abdominal pain, constipation, dyspepsia,* intestinal obstruction, necrotizing enterocolitis, hyperbilirubinemia, hepatic failure
HEMA: Neutropenia, lymphopenia, thrombocytopenia, anemia
INTEG: *Hand and foot syndrome, dermatitis,* nail disorders
OTHER: *Eye irritation, edema, myalgia,* limb pain, *pyrexia,* dehydration
RESP: *Cough, dyspnea,* pulmonary embolism

PHARMACOKINETICS

Readily absorbed, peak 1½ hr, food decreases absorption, extensively metabolized in the liver, elimination half-life 45 min

INTERACTIONS

Increase: toxicity—leucovorin
Increase: capecitabine levels—antacids (aluminum, magnesium)
Increase: phenytoin level—phenytoin

Black Box Warning: Increase: bleeding risk—anticoagulants

Drug/Food
Increase: absorption; give within 30 min of a meal
Drug/Lab Test
Increase: bilirubin
Decrease: Hgb/HcT/RBC, neutrophils, platelets, WBC

NURSING CONSIDERATIONS

Assess:

- **Bone marrow suppression,** CBC (RBC, Hct, Hgb), differential, platelet count weekly; withhold product if WBC is $<4000/mm^3$, platelet count is $<75{,}000/mm^3$, or RBC, Hct, Hgb low; notify prescriber of these results; frequently monitor INR in those receiving warfarin concurrently
- Renal studies: BUN, serum uric acid, urine CCr, electrolytes before, during therapy
- Monitor temp q4hr; fever may indicate beginning infection; no rectal temps
- Hepatic studies before, during therapy: bilirubin, ALT, AST, alk phos as needed or monthly

Black Box Warning: Bleeding: hematuria, heme-positive stools, bruising or petechiae of mucosa or orifices q8hr, monitor INR and PT in those taking anticoagulants

- Dyspnea, crackles, unproductive cough, chest pain, tachypnea, fatigue, increased pulse, pallor, lethargy; personality changes with high doses
- **Hand and foot syndrome:** paresthesia, tingling, painful/painless swelling, blistering, erythema with severe pain of hands or feet
- **Toxicity:** severe diarrhea (multiple times/day or at night), nausea, vomiting, stomatitis, fever
- Buccal cavity q8hr for dryness, sores, ulceration, white patches, oral pain, bleeding, dysphagia
- **GI symptoms:** frequency of stools, cramping; if severe diarrhea occurs, fluid, electrolytes may need to be given

Perform/provide:
• Rinsing of mouth tid-qid with water, club soda; brushing of teeth bid-tid with soft brush or cotton-tipped applicators for stomatitis; use unwaxed dental floss
Evaluate:
• Therapeutic response: decreased tumor size, spread of malignancy
Teach patient/family:
• To avoid foods with citric acid, hot or rough texture if stomatitis is present; take with water within 30 min of end of meal
• To notify prescriber if pregnancy is planned or suspected, pregnancy (D); to avoid pregnancy while taking this product; not to breastfeed
• Not to double dose if missed
⚠ To immediately report severe diarrhea, vomiting, stomatitis, fever of more than 100° F (37.8° C), hand and foot syndrome, anorexia
• To report signs of **infection:** increased temp, sore throat, flulike symptoms; signs of **anemia:** fatigue, headache, faintness, shortness of breath, irritability; **bleeding;** to avoid use of razors, commercial mouthwash
• OTC antidiarrheals for mild diarrhea (4-6 stools/day or diarrhea at night)

captopril (Rx)

(kap'toe-pril)
Apo-Capto ✤, Capoten
Func. class.: Antihypertensive
Chem. class.: Angiotensin-converting enzyme (ACE) inhibitor

Do not confuse:
captopril/Capitrol/carvedilol

ACTION: Selectively suppresses renin-angiotensin-aldosterone system; inhibits ACE; prevents conversion of angiotensin I to angiotensin II

USES: Hypertension, CHF, left ventricular dysfunction after MI, diabetic nephropathy

Unlabeled uses: Acute MI, hypertensive emergency/urgency, scleroderma renal crisis (SRC)

CONTRAINDICATIONS: Breastfeeding, children, hypersensitivity, heart block, potassium-sparing diuretics, bilateral renal artery stenosis, angioedema

Black Box Warning: Pregnancy (D)

Precautions: Dialysis patients, hypovolemia, leukemia, scleroderma, SLE, blood dyscrasias, CHF, diabetes mellitus, thyroid/renal/hepatic disease, COPD, asthma

DOSAGE AND ROUTES

Hypertension
• **Adult: PO** initial dose: 12.5-25 mg bid-tid; may increase to 50 mg bid-tid at 1-2 wk intervals; usual range: 25-150 mg bid-tid; max 450 mg/day
• **Child: PO** 0.3-0.5 mg/kg/dose, titrate up to 6 mg/kg/day in 2-4 divided doses
• **Neonate: PO** 0.01-0.1 mg/kg/dose, may increase as needed
CHF
• **Adult: PO** 25 mg bid; may increase to 50 mg tid; after 14 days, may increase to 150 mg tid if needed
Diabetic nephropathy
• **Adult: PO** 25 mg tid
Renal dose
• **Adult: PO** CCr >50 ml/min, no change; CCr 10-50 ml/min, decrease dose by 25%; CCr <10 ml/min, decrease dose by 50%
Acute MI (unlabeled) or post-MI
• **Adult: PO** 6.25-12.5 mg tid, increase to 25 mg tid gradually
Hypertensive emergency/urgency (unlabeled)
• **Adult: PO** 25 mg, may repeat q30min
Available forms: Tabs 12.5, 25, 50, 100 mg
Administer:
• 1 hr before or 2 hr after meals
• **Oral sol:** may crush tab, dissolve in water; give within ½ hr; make sure tab completely dissolved

SIDE EFFECTS

CNS: Fever, chills
CV: *Hypotension,* postural hypotension, *tachycardia,* angina
GI: Loss of taste, increased LFTs
GU: Impotence, dysuria, nocturia, proteinuria, nephrotic syndrome, acute reversible renal failure, polyuria, oliguria, urinary frequency
HEMA: Neutropenia, agranulocytosis, pancytopenia, thrombocytopenia, anemia
INTEG: Rash, pruritus
MISC: Angioedema, hyperkalemia
RESP: Bronchospasm, *dyspnea, cough*

PHARMACOKINETICS

Peak 1 hr; duration 2-6 hr; half-life <2 hr, increased in renal disease; metabolized by liver (metabolites); excreted in urine; crosses placenta; excreted in breast milk, small amounts; protein binding 25%-30%

INTERACTIONS

• Do not use with potassium-sparing diuretics, sympathomimetics, potassium supplements
Increase: possible toxicity—lithium, digoxin
Increase: hypoglycemia—insulin, oral antidiabetics
Increase: hypotension—diuretics, other antihypertensives, phenothiazines, nitrates, acute alcohol ingestion
Decrease: captopril effect—antacids, NSAIDs, salicylates
Drug/Herb
Increase: antihypertensive effect—hawthorn
Decrease: antihypertensive effect—ephedra
Drug/Food
Decrease: absorption of captopril
Drug/Lab Test
Increase: AST, ALT, alk phos, bilirubin, uric acid, potassium
Decrease: platelets, WBC, RBC, Hgb/HcT
False positive: urine acetone, ANA titer

NURSING CONSIDERATIONS

Assess:
• **Blood dyscrasias:** blood studies: decreased platelets; WBC with differential at baseline and periodically q3mo; if neutrophils $<1000/mm^3$, discontinue treatment (recommended with collagen-vascular or renal disease)
• **Hypertension:** B/P, pulse rates at baseline, frequently
• Renal studies: protein, BUN, creatinine; watch for raised levels, may indicate nephrotic syndrome; increased LFTs, uric acid; glucose may be increased
• **Allergic reaction:** rash, fever, pruritus, urticaria; discontinue product if antihistamines fail to help
• **CHF:** edema, dyspnea, wet crackles, increased B/P, weight gain
Perform/provide:
• Storage in tight container at 86° F (30° C) or less
Evaluate:
• Therapeutic response: decrease in B/P with hypertension; edema, moist crackles (CHF)
Teach patient/family:
• To take 1 hr before or 2 hr after meals; not to discontinue product abruptly; if dose is missed, take as soon as remembered but not if almost time for next dose; not to double doses
• Not to use OTC products (cough, cold, or allergy) unless directed by prescriber; avoid salt substitutes, high-potassium or high-sodium foods
• To adhere to dosage schedule, even if feeling better
• To rise slowly to sitting or standing position to minimize orthostatic hypotension
• To notify prescriber of mouth sores, sore throat, fever, swelling of hands or feet, irregular heartbeat, chest pain, signs of angioedema
• That excessive perspiration, dehydration, vomiting, diarrhea may lead to fall in B/P; to consult prescriber if these occur

- That dizziness, fainting, lightheadedness may occur during first few days of therapy
- That skin rash or impaired perspiration may occur
- How to take B/P and when to notify prescriber

Black Box Warning: To report if pregnancy is suspected or planned, pregnancy (D)

TREATMENT OF OVERDOSE:
0.9% NaCl IV/INF; hemodialysis

carbachol ophthalmic
See Appendix B

carBAMazepine (Rx)
(kar-ba-maz'e-peen)
Carbatrol, Epitol, Equetro, Tegretol, Tegretol-XR
Func. class.: Anticonvulsant
Chem. class.: Iminostilbene derivative

Do not confuse:
TEGretol/Toradol

ACTION: Exact mechanism unknown; appears to decrease polysynaptic responses and block posttetanic potentiation

USES: Tonic-clonic, complex-partial, mixed seizures; trigeminal neuralgia; bipolar disorder
Unlabeled uses: Neurogenic pain, psychotic behavior with dementia, diabetic neuropathy, agitation, hiccups

CONTRAINDICATIONS: Pregnancy (D), hypersensitivity to carBAMazepine or tricyclics, AV or bundle branch block

Black Box Warning: Bone marrow depression

Precautions: Breastfeeding, children <6 yr, glaucoma, cardiac/renal/hepatic disease, psychosis, alcoholism, hepatic porphyria

Black Box Warning: Hematologic disease, Asian patients, agranulocytosis, leukopenia, neutropenia, thrombocytopenia

C

DOSAGE AND ROUTES

Seizures
- **Adult and child >12 yr: PO** 200 mg bid, may be increased by 200 mg/day in weekly intervals, give in divided doses q6-8hr; maintenance 800-1200 mg/day, max 1600 mg/day (adult); max child 12-15 yr 1000 mg/day; max child >15 yr 1200 mg/day; adjust to minimum dose to control seizures; **EXT REL** give bid; rectal administration of **ORAL SUSP** 200 mg/10 ml or 6 mg/kg as a single dose
- **Child 6-12 yr: PO** tabs 100 mg bid or susp 50 mg qid; may increase by <100 mg q wk; max 1000 mg/day **EXT REL** tabs daily-bid
- **Child <6 yr: PO** 10-20 mg/kg/day in 2-3 divided doses, may increase every wk

Trigeminal neuralgia
- **Adult: PO** 100 mg bid with meals; may increase 100 mg q12hr until pain subsides, max 1200 mg/day; maintenance 200-400 mg bid

Diabetic neuropathy (unlabeled)
- **Adult: PO** 100 mg bid or 50 mg qid, titrate to 600-800 mg/day

Bipolar disorder
- **Adult: PO** (Equetro only) 200 mg bid, may adjust dose by 200 mg/day to desired response, max 1600 mg/day

Agitation due to dementia (unlabeled)
- **Adult: PO** 100 mg bid, may increase to 250-300 mg/day

Hiccups (unlabeled)
- **Adult: PO** 200 mg tid

Available forms: Chewable tabs 100, 200 mg; tabs 200 mg; ext rel tabs (XR) 100, 200, 400 mg; oral susp 100 mg/5 ml; ext rel caps 100, 200, 300 mg

Administer:

PO route

- Do not crush, chew ext rel tab; ext rel cap may be opened and beads sprinkled over food; patient should chew chewable tab, not swallow it whole
- With food, milk to decrease GI symptoms; shake oral susp before use
- Mix an equal amount of water, D_5W, 0.9% NaCl when giving by NG tube; flush tube with 100 ml of above sol

SIDE EFFECTS

CNS: *Drowsiness,* dizziness, unsteadiness, confusion, fatigue, paralysis, headache, hallucinations, worsening of seizures, speech disturbance, suicidal thoughts/behaviors

CV: Hypertension, CHF, dysrhythmias, AV block, hypotension, aggravation of cardiac artery disease

EENT: Tinnitus, dry mouth, blurred vision, diplopia, nystagmus, conjunctivitis

ENDO: SIADH (geriatric patients)

GI: *Nausea, constipation, diarrhea,* anorexia, vomiting, abdominal pain, stomatitis, glossitis, increased hepatic enzymes, hepatitis, hepatic porphyria

GU: Frequency, retention, albuminuria, glycosuria, impotence, increased BUN, renal failure

HEMA: Thrombocytopenia, leukopenia, agranulocytosis, leukocytosis, aplastic anemia, eosinophilia, increased PT

INTEG: *Rash,* Stevens-Johnson syndrome, urticaria, photosensitivity, toxic epidermal necrolysis

RESP: Pulmonary hypersensitivity (fever, dyspnea, pneumonitis)

PHARMACOKINETICS

Onset slow; peak 4-5 hr; metabolized by liver; excreted in urine, feces; crosses placenta, blood-brain barrier; excreted in breast milk; half-life 18-65 hr then 8-29 hr after 1st month; protein binding 76%; metabolized by CYP3A4

INTERACTIONS

- CNS toxicity: lithium

⚠ Fatal reaction: MAOIs

Increase: carBAMazepine levels—CYP3A inhibitors (cimetidine, clarithromycin, danazol, diltiazem, erythromycin, FLUoxetine, fluvoxamine, isoniazid, propoxyphene, valproic acid, verapamil, voriconazole)

Increase: effects of desmopressin, lithium, lypressin, vasopressin

Decrease: carBAMazepine effect—CYP1A2, CYP2C9 substrates

Decrease: effect of CYP3A inducers

Decrease: effects of benzodiazepines, doxycycline, felbamate, haloperidol, oral contraceptives, PHENobarbital, phenytoin, primidone, theophylline, thyroid hormones, warfarin

Decrease: carBAMazepine levels—CYP3A4 inducers (CISplatin, darunavir, delavirdine, DOXOrubicin, felbamate, nefazodone, OXcarbazepine, PHENobarbital, phenytoin, primidone, rifampin, theophylline)

Drug/Herb

Decrease: carBAMazepine metabolism, increased levels—echinacea

Decrease: anticonvulsant effect—St. John's wort

Drug/Food

Increase: peak concentration of carBAMazepine—grapefruit juice

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Asian patients for serious skin reaction; genetic test before administration

- **Seizures:** character, location, duration, intensity, frequency, presence of aura
- **Trigeminal neuralgia:** facial pain including location, duration, intensity, character, activity that stimulates pain
- Renal studies: urinalysis, BUN, urine creatinine q3mo

Black Box Warning: **Bone marrow depression:** blood studies: RBC, Hct, Hgb, reticulocyte counts every wk for 4 wk then q3-6mo if on long-term therapy; if myelosuppression occurs, product should be discontinued; blood dyscrasias: fever, sore throat, bruising, rash, jaundice

- Hepatic studies: ALT, AST, bilirubin
- Product levels during initial treatment or when changing dose; should remain at 4-12 mcg/ml; anorexia may indicate increased blood levels
- ⚠ Mental status: mood, sensorium, affect, behavioral changes, **suicidal thoughts/behaviors**; if mental status changes, notify prescriber
- Eye problems: need for ophthalmic examinations before, during, after treatment (slit lamp, funduscopy, tonometry)
- Allergic reaction: purpura, red, raised rash; if these occur, product should be discontinued
- ⚠ Toxicity: bone marrow depression, nausea, vomiting, ataxia, diplopia, CV collapse, Stevens-Johnson syndrome

Perform/provide:
- Storage at room temp
- Hard candy, gum, frequent rinsing for dry mouth

Evaluate:
- Therapeutic response: decreased seizure activity; document on patient's chart

Teach patient/family:
- To carry emergency ID stating patient's name, products taken, condition, prescriber's name and phone number
- To avoid driving, other activities that require alertness usually for the first 3 days of treatment
- Not to discontinue medication quickly after long-term use
- To immediately report chills, rash, light-colored stools, dark urine, yellowing of skin and eyes, abdominal pain, sore throat, mouth ulcers, bruising, blurred vision, dizziness
- That urine may turn pink to brown
- To notify if pregnancy is planned or suspected, pregnancy (D), avoid breastfeeding

TREATMENT OF OVERDOSE: Lavage, VS

⚠ HIGH ALERT

C

CARBOplatin (Rx)

(kar-boe-pla'-tin)

Func. class.: Antineoplastic alkylating agent

Chem. class.: Platinum coordination compound

Do not confuse:
CARBOplatin/CISplatin

ACTION: Produces interstrand DNA cross-links and, to a lesser extent, DNA-protein cross-links; activity is not cell-cycle–phase specific

USES: Initial treatment of advanced ovarian cancer in combination with other agents; palliative treatment of ovarian carcinoma recurrent after treatment with other antineoplastic agents

Unlabeled uses: Acute lymphocytic leukemia (ALL), acute myelogenous leukemia (AML), bladder/breast/head/neck/lung/testicular cancer, bone marrow ablation, malignant glioma, neuroblastoma, non-Hodgkin's lymphoma, osteogenic sarcoma, soft-tissue sarcoma, stem-cell transplant preparation, Wilms' tumor, stage I seminoma

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, hypersensitivity, significant bleeding, aluminum products used to prepare or administer CARBOplatin

Black Box Warning: Severe bone marrow depression, platinum compound hypersensitivity

Precautions: Geriatric patients, radiation therapy within 1 mo, other cancer chemotherapy within 1 mo, renal/hepatic disease

Black Box Warning: Anemia, infection

DOSAGE AND ROUTES

Dosing with the Calvert equation

• **Adult:** The total CARBOplatin dose in mg for adults may be calculated using the Calvert equation:
Total dose (mg) = target AUC × (GFR + 25)

• **Children:** Calculate CARBOplatin dosage (mg/m^2) in children:
Total dose (mg/m^2) = target AUC × [(0.93 × GFR) + 15]

Advanced ovarian cancer

• **Adult (single agent): IV INF** initially 300 mg/m^2 on day 1 with cyclophosphamide, 600 mg/m^2 **IV** on day 1, repeat q4wk × 6 cycles; refractory tumors 360 mg/m^2 single dose, may repeat q4wk as needed, do not repeat until neutrophils >2000/mm^3 and platelets >100,000/mm^3

Renal dose

• **Adult (single agent): IV INF** CCr 41-59 ml/min, 250 mg/m^2, CCr 16-40 ml/min, 200 mg/m^2, do not use if CCr <15 ml/min

ALL (unlabeled)

• **Adult <21 yr/adolescent/child: IV** 635 mg/m^2 on day 3 with ifosfamide, mesna, etoposide

Relapsed Wilms' tumor (unlabeled)

• **Child: IV** 400 mg/m^2 × 2 days with etoposide, ifosfamide

Osteogenic sarcoma (unlabeled)

• **Adult/adolescent/child: IV** 560 mg/m^2 on day 1 with ifosfamide 2.65 g/m^2/day **IV** on days 1-3

Neuroblastoma/soft-tissue sarcoma (unlabeled)

• **Child: IV** 300-600 mg/m^2 q4wk or 400 mg/m^2/day for 2 days q4wk or 160 mg/m^2/day × 5 days q4wk

Available forms: Lyophilized powder for inj 50-, 150-, 450-mg vials; aqueous sol for inj 50 mg/5-ml vial, 150 mg/15-ml vial, 450 mg/45-ml vial, 600 mg/60-ml vial

Administer:

• Antiemetic 30-60 min before product and prn for vomiting

IV route

• Do not use needles or IV administration sets that contain aluminum; may cause precipitate or loss of potency

• Use cytotoxic handling procedures

• Storage protected from light at room temp; reconstituted vials stable for 24 hr at room temp, Paraplatin multidose (10 mg/ml) vials stable for up to 14 days after entry into vial

• **Reconstitute** CARBOplatin 50, 150, or 450 mg with 5, 15, or 45 ml, respectively, of sterile water for inj, D_5W, or NaCl (10 mg/ml); then further **dilute** with the same sol to 0.5-4 mg/ml; **give** over 15 min or more (intermittent INF)

• **Continuous IV INF** over 24 hr; max dose based on (GFR=125 mg/ml)

Solution compatibilities: D_2/0.2% NaCl, D_2/0.45% NaCl, D_2/0.9% NaCl, 0.9% NaCl, D_5W, sterile water for inj

Y-site compatibilities: Acyclovir, alfentanil, allopurinol, amifostine, amikacin, aminocaproic acid, aminophylline, amiodarone, amphotericin B lipid complex, amphotericin B liposome, ampicillin, ampicillin-sulbactam, anidulafungin, atenolol, atracurium, azithromycin, aztreonam, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, caspofungin, ceFAZolin, cefepime, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, ceftAZidime, ceftizoxime, cefTRIAXone, cefuroxime, cimetidine, ciprofloxacin, cisatracurium, CISplatin, cladribine, clindamycin, codeine, cyclophosphamide, cycloSPORINE, cytarabine, DAPTOmycin, DAUNOrubicin, dexamethasone, dexmedetomidine, dexrazoxane, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, doripenem, doxacurium, DOXOrubicin, DOXOrubicin liposomal, doxycycline, droperidol, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, ertapenem, erythromycin, esmolol, etoposide, famotidine, fenoldopam, fentaNYL, filgrastim, fluconazole, fludarabine, fluorouracil, foscarnet, fosphenytoin, furosemide, ganciclovir, gatifloxacin, gemcitabine, gentamicin, granisetron, haloperidol, heparin, hydrocortisone, HYDROmorphone, hydrOXYzine, IDArubicin, ifosfamide, imipenem-cilastatin, inamrinone, insulin (regular),

irinotecan, isoproterenol, ketorolac, labetalol, levofloxacin, levorphanol, lidocaine, linezolid injection, LORazepam, magnesium sulfate, mannitol, melphalan, meperidine, meropenem, mesna, methohexital, methotrexate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, micafungin, midazolam, milrinone, minocycline, mitoXANtrone, mivacurium, morphine, nafcillin, nalbuphine, naloxone, nesiritide, niCARdipine, nitroglycerin, nitroprusside, norepinephrine, octreotide, ofloxacin, ondansetron, oxaliplatin, PACLitaxel, palonosetron, pamidronate, pancuronium, pantoprazole, PEMEtrexed, pentamidine, PENTobarbital, PHENobarbital, phenylephrine, piperacillin, piperacillin-tazobactam, potassium chloride, potassium phosphates, prochlorperazine, promethazine, propofol, propranolol, ranitidine, remifentanil, riTUXimab, rocuronium, sargramostim, sodium acetate, sodium bicarbonate, sodium phosphates, succinylcholine, SUFentanil, sulfamethoxazole-trimethoprim, tacrolimus, teniposide, theophylline, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, TNA, tobramycin, topotecan, TPN, trastuzumab, trimethobenzamide, vancomycin, vasopressin, vecuronium, verapamil, vinBLAStine, vinCRIStine, vinorelbine, voriconazole, zidovudine

SIDE EFFECTS

CNS: Seizures, central neurotoxicity, *peripheral neuropathy,* dizziness, confusion

CV: Cardiac abnormalities (fatal CV events), stroke

EENT: Tinnitus, hearing loss, *vestibular toxicity,* visual changes

GI: *Severe nausea, vomiting,* diarrhea, weight loss, mucositis, anorexia, constipation, taste change

HEMA: Thrombocytopenia, leukopenia, pancytopenia, neutropenia, anemia, bleeding

INTEG: *Alopecia,* dermatitis, rash, erythema, pruritus, urticaria

META: Hypomagnesemia, hypocalcemia, hypokalemia, hyponatremia, hyperuremia

SYST: Anaphylaxis

PHARMACOKINETICS

Initial half-life 1-2 hr, postdistribution half-life $2^1/_2$-6 hr, not bound to plasma proteins, excreted by the kidneys

INTERACTIONS

Increase: nephrotoxicity or ototoxicity—aminoglycosides, amphotericin B

Increase: bleeding risk—aspirin, NSAIDs, thrombolytics, anticoagulants, platelet inhibitors

Increase: toxicity—radiation, bone marrow suppressants

Increase: myelosuppression—myelosuppressives

Decrease: phenytoin levels, monitor levels

Drug/Lab Test

Increase: AST, BUN, alk phos, bilirubin, creatinine

Decrease: platelets, neutrophils, WBC, RBC, Hgb/HCT, calcium, potassium, magnesium, phosphate

NURSING CONSIDERATIONS

Assess:

Black Box Warning: To only be used by person experienced in the use of Chemotherapeutic products, in a specialized care setting

Black Box Warning: **Bone marrow depression:** CBC, differential, platelet count weekly; withhold product if neutrophil count is $<2000/mm^3$ or platelet count is $<100{,}000/mm^3$; notify prescriber of results; calcium, magnesium, phosphate, potassium, sodium, uric acid, CCR, bilirubin; CCr <60 ml/min may be responsible for increased bone marrow suppression; assess frequently for infection

- Renal studies: BUN, creatinine, serum uric acid; urine CCr before, during therapy; I&O ratio; report fall in urine output to <30 ml/hr
- Monitor temp q4hr (may indicate beginning infection)

• Hepatic studies before, during therapy (bilirubin, AST, ALT, LDH) as needed or monthly; jaundice of skin, sclera; dark urine, clay-colored stools, itchy skin, abdominal pain, fever, diarrhea

⚠ **Anaphylaxis:** hypotension, rash, pruritus, wheezing, tachycardia may occur within a few mins of use; notify prescriber after discontinuing product; resuscitation equipment should be available

• Delay dental work until blood counts have returned to normal; regular toothbrushes, dental floss, and toothpicks should not be used, use soft bristle toothbrush

• **Peripheral neuropathy:** may be increased in geriatric patients

• **Bleeding;** hematuria, stool guaiac, bruising, petechiae, mucosa or orifices; avoid all IM injections if platelets $<50{,}000/mm^3$

• Effects of alopecia on body image; discuss feelings about body changes

Evaluate:

• Therapeutic response: decreasing size of tumor, spread of malignancy

Teach patient/family:

• To report ringing/roaring in the ears; numbness, tingling in face, extremities; weight gain

• That impotence or amenorrhea can occur; that this is reversible after treatment is discontinued; to notify prescriber if pregnancy is suspected or planned; pregnancy (D), that contraception should be used if patient is fertile

• Not to breastfeed during treatment

• To avoid OTC products with aspirin, NSAIDs, alcohol; not to receive vaccinations during treatment

⚠ To notify prescriber immediately of fever, fatigue, sore throat, bleeding, bruising, chills, back pain, blood in stools, dyspnea

• That hair may be lost during treatment; that a wig or hairpiece may make the patient feel better; that new hair may be different in color, texture

• To avoid crowds, persons with known infections; to avoid the use of razors, stiff-bristle toothbrushes

carboprost (Rx)

(kar'boe-prost)

Hemabate

Func. class.: Oxytocic, abortifacient

Chem. class.: Prostaglandin

ACTION: Stimulates uterine contractions, causes complete abortion in approximately 16 hr

USES: Abortion at 13-20 wk gestation, postpartum hemorrhage caused by uterine atony not controlled by other methods

Unlabeled uses: Hemorrhagic cystitis

CONTRAINDICATIONS: Hypersensitivity to this product or benzyl alcohol, severe CV/respiratory/renal/hepatic disease, PID

Precautions: Pregnancy (C), asthma, anemia, jaundice, diabetes mellitus, hypo/hypertension, seizure disorders, past uterine surgery

DOSAGE AND ROUTES

Pregnancy termination between 13-20 wk gestation

• **Adult: IM** 100 mcg (0.4 ml) test dose, then 250 mcg, then 250 mcg q$1^1/_2$-$3^1/_2$hr; may increase to 500 mcg if no response, max 12 mg total dose

Postpartum hemorrhage

• **Adult: IM** 250 mcg, repeat at 15- to 90-min intervals; max total dosage 2 mg

Hemorrhagic cystitis (unlabeled)

• **Adult: INTRAVESICULAR** 0.8 mg/dl in 50 ml of saline instilled into the bladder for 60 min, q6hr × 4 doses

Available forms: Inj 250 mcg/ml

Administer:

• Only by trained personnel in a hospital that can provide emergency services

• Incomplete abortion may occur in 20% of patients

• Give antiemetics to prevent nausea/vomiting

• In deep muscle mass; aspirate before inj, rotate inj sites if additional doses given

SIDE EFFECTS

CNS: *Fever, chills,* headache
GI: *Nausea, vomiting, diarrhea*

PHARMACOKINETICS

Peak 15-60 min, excreted in urine (major metabolites)

INTERACTIONS

Increase: action—other oxytocics

NURSING CONSIDERATIONS

Assess:
• B/P, pulse; watch for change that may indicate hemorrhage
• For length, duration of contractions; notify prescriber of contractions that last more than 1 min or absence of contractions; watch for signs of uterine rupture
• For incomplete abortion, pregnancy must be terminated by another method; product is teratogenic
Perform/provide:
• Storage in refrigerator
Evaluate:
• Therapeutic response: expulsion of fetus, control of bleeding
Teach patient/family:
• To report increased blood loss, abdominal cramps, increased temp, foul-smelling lochia

carglumic acid

(kar-gloo'mik)

Carbaglu

Func. class.: Antihyperammonemic agent

ACTION: The enzyme *N*-acetylglutamate synthase (NAGS) produces *N*-acetylglutamate (NAG), which is an essential activator of carbamoyl phosphate synthetase 1 (CPS 1). CPS 1 is the first enzyme of the urea cycle, and the enzyme converts ammonia to urea. Patients with NAGS deficiency do not produce enough NAG, resulting in hyperammonemia. Carglumic acid is a synthetic structural analog of NAG that works to activate CPS 1 and thus convert ammonia to urea.

C

USES: Acute or chronic hyperammonemia in persons with *N*-acetylglutamate synthetase deficiency
Precautions: Breastfeeding, pregnancy (C), geriatric patients

DOSAGE AND ROUTES

• **Adult/child:** PO 100-250 mg/kg/day (rounded to the nearest 100 mg) initially, divided; bid-qid, given immediately before meals, titrate to ammonia level; usual maintenance dose <100 mg/kg/day
Available forms: Tabs 200 mg
Administer
• Do not give whole or crushed tablets, disperse each tablet in ≥2.5 ml of water immediately before use. The tablets do not dissolve completely in water, and undissolved tablet particles can remain; rinse the mixing container with water and give to the patient, do not mix with foods or other fluids
Nasogastric tube
• Mix each tablet in ≥2.5 ml of water (80 mg/ml), shake gently, give the correct volume immediately through the NG tube, flush with additional water, discard any unused portion
Oral syringe
• Mix each tablet in ≥2.5 ml of water (80 mg/ml), shake gently, draw up the appropriate volume in an oral syringe and give immediately, refill syringe with ≥1-2 ml and give immediately, discard any unused portion

SIDE EFFECTS

CNS: Headache, fever, asthenia
EENT: Tonsillitis, ear infections
GI: Abdominal pain, vomiting, taste change, anorexia, diarrhea
OTHER: Infection, anemia, weight loss, rash

PHARMACOKINETICS

Peak 3 hr, half-life 5.6 hr

INTERACTIONS

Drug/Lab Test

Decrease: Hgb level

NURSING CONSIDERATIONS

Assess:

Neurologic symptoms and ammonia levels: Headache, fever, change in level of consciousness

Infection: Assess for upper respiratory infections, influenza, pneumonia

Evaluate:

- Decreasing ammonia levels

Teach patient/family:

- Not to swallow whole or crush, but disperse in water
- That blood for lab tests will be drawn regularly
- To advise prescriber if pregnancy is planned or suspected, not to breastfeed
- That a high-calorie, low-protein diet is necessary when ammonia levels are elevated
- To report adverse reactions of vomiting, infection, ear pain, headache
- Store unopened containers in refrigerator; opened bottle may be stored at room temperature for up to 1 mo; product stored at controlled room temperature should not be returned to a refrigerator; protect from moisture; discard opened bottle after 30 days

carisoprodol (Rx)

(kar-eye-soe-proe′dole)

Soma

Func. class.: Skeletal muscle relaxant, central acting

Chem. class.: Meprobamate congener

Do not confuse:

Soma/Soma Compound

ACTION: Depresses CNS by blocking interneuronal activity in descending reticular formation, spinal cord, thereby producing sedation

USES: Relieving pain, stiffness with musculoskeletal disorders

CONTRAINDICATIONS: Hypersensitivity, intermittent porphyria

Precautions: Pregnancy (C), breastfeeding, geriatric patients, Asian patients, renal/hepatic disease, addictive personality

DOSAGE AND ROUTES

- **Adult/adolescent ≥16 yr: PO** 250-350 mg tid and at bedtime, max 3 wk of use

Available forms: Tabs 350 mg

Administer:

- With meals for GI symptoms
- For short term (2-3 wk), potential for habituation
- Storage in tight container at room temp

SIDE EFFECTS

CNS: *Dizziness, weakness, drowsiness,* headache, tremor, depression, insomnia, ataxia, irritability, seizures

CV: Postural hypotension, tachycardia

EENT: Diplopia, temporary loss of vision

GI: *Nausea,* vomiting, hiccups, epigastric discomfort

HEMA: Eosinophilia

INTEG: Rash, pruritus, fever, facial flushing, erythema multiforme

RESP: Asthmatic attacks

SYST: Angioedema, anaphylaxis

PHARMACOKINETICS

PO: Onset ½ hr; peak 4 hr; duration 4-6 hr; extensively metabolized by liver, substrate of CYP2C19; excreted in urine; crosses placenta; excreted in breast milk (large amounts); half-life 8 hr

INTERACTIONS

- Do not use together with meprobamate

Increase: CNS depression—alcohol, tricyclics, opioids, barbiturates, sedatives, hypnotics

Increase: carisoprodol effect—CYP2C19 inhibitors (FLUoxetine, fluvoxaMINE, isoniazid, modafinil)
Decrease: carisoprodol effect—CYP219 inducers (rifampin)
Drug/Herb
Increase: CNS depression—kava, valerian
Increase: metabolism of carisoprodol—St. John's wort
Drug/Lab Test
Increase: eosinophils
Increase: RBC, WBC, platelets

NURSING CONSIDERATIONS

Assess:
- **Pain,** stiffness, mobility, activities of daily living at baseline and throughout treatment
- **ECG in seizure patients:** poor seizure control has occurred among patients taking this product
- BUN, creatinine at baseline and periodically
- **Idiosyncratic reaction:** (weakness, dizziness, blurred vision, confusion, euphoria), anaphylaxis within a few minutes or hours of 1st to 4th dose, withhold and notify prescriber
- **Allergic reactions:** rash, fever, respiratory distress, anaphylaxis, angioedema
- **CNS depression:** dizziness, drowsiness, psychiatric symptoms, abuse potential
- **Abrupt discontinuation:** withdrawal reactions do occur but may be mild, dependence may occur

Perform/provide:
- Assistance with ambulation if dizziness, drowsiness occurs, especially for geriatric patients

Evaluate:
- Therapeutic response: decreased pain, spasticity; increased ROM

Teach patient/family:
- To avoid hazardous activities if drowsiness, dizziness occur; not to drive while taking product, to avoid rapid position changes, postural hypotension occurs
- To avoid using OTC medications (cough preparations, antihistamines) unless directed by prescriber; not to take with alcohol, other CNS depressants
- To report allergic reaction immediately: rash, swelling of tongue/lips, hives, dyspnea
- To take with food for GI symptoms

C

TREATMENT OF OVERDOSE:
Activated charcoal, dialysis, lavage

⚠ HIGH ALERT

carmustine (Rx)
(kar-mus'teen)
BiCNU, Gliadel
Func. class.: Antineoplastic alkylating agent
Chem. class.: Nitrosourea

ACTION: Alkylates DNA, RNA; able to inhibit enzymes that allow for the synthesis of amino acids in proteins; activity is not cell-cycle–phase specific

USES: Brain tumors such as glioblastoma, medulloblastoma, brain stem glioma, astrocytoma, ependymoma, metastatic brain tumors; multiple myeloma (with predniSONE), non-Hodgkin's disease, Hodgkin's disease, other lymphomas; GI, breast, bronchogenic, renal carcinomas; wafer, as adjunct to surgery/radiation for patients newly diagnosed with high-grade malignant glioma
Unlabeled uses: Ablation, mycosis fungoides, stem cell transplant preparation

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, hypersensitivity, leukopenia, thrombocytopenia
Precautions: Dental disease, extravasation, females, infection, leukopenia, neutropenia, secondary malignancy, thrombocytopenia

Black Box Warning: Bone marrow suppression, pulmonary fibrosis

DOSAGE AND ROUTES

Brain tumors, Hodgkin's disease, malignant lymphoma, multiple myeloma

• **Adult: IV** 75-100 mg/m² over 1-2 hr × 2 days or 150-200 mg/m² × 1 dose q6-8wk or 40 mg/m²/day × 5 days q6wk or 150-200 mg/m² q6wk; **INTRACAVITARY** up to 8 wafers inserted into resection cavity

• **Child (unlabeled): IV** 200-250 mg/m² as a single dose q4-6wks

Stem cell transplant/bone marrow ablation (unlabeled)

• **Adult: IV** 450-600 mg/m² as a single dose or 2 divided doses q12hr at a rate of no more than 3 mg/m²/min

Available forms: Powder for inj 100 mg; wafer 7.7 mg (intracavitary)

Administer:

• Storage of reconstituted sol in refrigerator for 24 hr or at room temp for 8 hr; protect from light

• Blood transfusions, RBC colony-stimulating factors to counter anemia

• Antiemetic, serotonin antagonists, dexamethasone, nausea, vomiting can begin 2 hr after a dose and last ≤6 hr and may be severe

• All medications PO, if possible; avoid IM inj if platelets are <100,000/mm³

Black Box Warning: Carmustine should not be given until platelets >100,000/mm³ and WBC >4000/mm²

Wafer route

• If wafers are broken into several pieces, they should not be used

• Foil pouches may be kept at room temp for 6 hr if unopened

Intermittent IV INF route

• Use cytotoxic handling procedures; do not use if an oil film appears on vial (decomposition)

• Do not use with PVC IV tubing, do not admix

• After **diluting** 100 mg product/3 ml ethyl alcohol (provided), **further dilute** with 27 ml sterile water for inj; **then dilute** with 100-500 ml 0.9% NaCl or D_5W, **give** over 1 hr or more, reduce rate if discomfort is felt; use only glass containers, protect from light

• **Flush** IV line after carmustine with 10 ml 0.9% NaCl to prevent irritation at site

Y-site compatibilities: Amifostine, amphotericin B lipid complex, amphotericin B liposome, anidulafungin, aztreonam, bivalirudin, bleomycin, caspofungin, cefepime, codeine, DAPTOmycin, dexmedetomidine, DOCEtaxel, ertapenem, etoposide, fenoldopam, filgrastim, fludarabine, gemcitabine, granisetron, levofloxacin, melphalan, meperidine, mitoXANtrone, nesiritide, octreotide, ondansetron, PACLitaxel, palonosetron, pamidronate, pantoprazole, PEMEtrexed, piperacillin-tazobactam, riTUXimab, sargramostim, sodium acetate, tacrolimus, teniposide, thiotepa, tigecycline, tirofiban, trastuzumab, vinCRIStine, vinorelbine, voriconazole

SIDE EFFECTS

GI: *Nausea, vomiting, anorexia, stomatitis,* hepatotoxicity

GU: *Azotemia,* renal failure

HEMA: Thrombocytopenia, leukopenia, myelosuppression, anemia

INTEG: Pain, burning, hyperpigmentation at inj site, alopecia

RESP: Fibrosis, pulmonary infiltrate

SYST: Secondary malignant neoplastic disease

PHARMACOKINETICS

Degraded within 15 min; crosses blood-brain barrier; 70% excreted in urine within 96 hr; 10% excreted as CO_2, fate of 20% is unknown

INTERACTIONS

Increase: bleeding risk—aspirin, anticoagulants

Increase: myelosuppression—myelosuppressive agents

Increase: toxicity: other antineoplastics, radiation, cimetidine

Increase: adverse reactions, decreased antibody reaction—live vaccines

Decrease: effects of digoxin, phenytoins

Drug/Lab Test

Increase: bilirubin, prolactin, uric acid, LFTs

Decrease: platelets, WBC, neutrophils, HCT

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Bone marrow suppression: CBC, differential, platelet count weekly; withhold product if WBC is <4000 or platelet count is <100,000; notify prescriber of results

• Hepatic studies: AST, ALT, bilirubin, monitor regularly, hepatotoxicity occurs rarely

Black Box Warning: Pulmonary fibrosis/infiltrate: pulmonary function tests, chest x-ray films before, during therapy; chest film should be obtained q2wk during treatment; monitor for dyspnea, cough, pulmonary fibrosis; infiltrate occurs after high doses or several low-dose courses (>1400 mg/m^2 cumulative dose), may occur months or years after treatment

Black Box Warning: Only to be used by an experienced clinician in use of cancer, immune suppression

• Renal studies: BUN, serum uric acid, urine CCr before, during therapy; I&O ratio; report fall in urine output of 30 ml/hr, may use allopurinol for hyperuricemia with increased fluids

• Monitor for cold, cough, fever (may indicate beginning infection)

• **Bleeding:** hematuria, guaiac, bruising, petechiae, mucosa, orifices q8hr

Perform/provide:

• Rinsing of mouth tid-qid with water or club soda; use of sponge brush for stomatitis

• Warm compresses at inj site for inflammation; reduce flow rate if patient complains of burning at inf site

Evaluate:

• Therapeutic response: decreasing size of tumor, spread of malignancy

Teach patient/family:

Black Box Warning: To report any changes in breathing or coughing, to avoid smoking

• To avoid foods with citric acid, hot or rough texture if stomatitis is present; to report any bleeding, white spots, ulceration in mouth to prescriber; to examine mouth daily

• To avoid aspirin, ibuprofen, razors, commercial mouthwash

• To report signs of anemia (fatigue, irritability, shortness of breath, faintness); to report signs of infection (sore throat, fever); pulmonary toxicity can occur up to 15 yr after treatment

• To use contraception during treatment; to avoid breastfeeding, pregnancy (D)

• Not to receive live vaccines during treatment

carteolol (ophthalmic)

(kar'tee-oh-lol)

Func. class.: Antiglaucoma

Chem. class.: Beta-blocker

ACTION: May decrease aqueous humor and increase outflows

USES: Treatment of chronic open-angle glaucoma and ocular hypertension

CONTRAINDICATIONS: Hypersensitivity, AV block, heart failure, bradycardia, sick sinus syndrome

Precautions: Abrupt discontinuation, children, pregnancy, breastfeeding, COPD, depression, diabetes mellitus, myasthenia gravis, hyperthyroidism, pulmonary disease, angle-closure glaucoma

DOSAGE AND ROUTES

• **Adult:** Instill 1 drop in the affected eye(s) bid.

Available forms: Ophthalmic solution 1%

Administer

- For ophthalmic use only. Shake the ophthalmic suspension well before use
- Do not touch the tip of the dropper to the eye, fingertips, or other surface to prevent contamination
- Wash hands before and after use. Tilt head back slightly and pull the lower eyelid down with the index finger to form a pouch. Squeeze the prescribed number of drops into the pouch. Close eyes to spread drops. To avoid excessive systemic absorption, apply finger pressure on the lacrimal sac for 1-2 min after use
- If more than one topical ophthalmic drug product is being used, the drugs should be administered at least 5 min apart
- To avoid contamination or the spread of infection, do not use dropper for more than one person, do not touch the eyelids or surrounding areas with the dropper tip of the bottle
- Decreased intraocular pressure can take several weeks, monitor IOP after a month

SIDE EFFECTS

CNS: Insomnia, headache, dizziness
CV: Palpitations
EENT: Eye stinging/burning, tearing, photophobia

PHARMACOKINETICS

Onset 30 min, peak 2 hr, duration ≥12 hr

INTERACTIONS

Increase: beta blocking effect—oral beta blockers
Increased: intraocular pressure reduction—topical miotics, dipivefrin, EPINEPHrine, carbonic anhydrase inhibitors, this may be beneficial
Increase: B/P, severe—when abruptly stopping cloNIDine
Increase: depression of AV nodal conduction, bradycardia, or hypotension—adenosine, cardiac glycosides, disopyramide, other antiarrhythmics, class IC antiarrhythmic drugs (flecainide, propafenone, moricizine, encainide, quiNIDine or drugs that significantly depress AV nodal conduction)
Increase: AV block nodal conduction, induce AV block—high doses of procainamide
Increase: antihypertensive effect—other antihypertensives

NURSING CONSIDERATIONS

Assess:

- **Systemic absorption:** When used in the eye, systemic absorption is common with the same adverse reactions and interactions
- Glaucoma: Monitor intraocular pressure

Evaluate:

- Decreasing intraocular pressure

Teach patient/family:

- For ophthalmic use only. Shake the ophthalmic suspension well before use
- Not to touch the tip of the dropper to the eye, fingertips, or other surface to prevent contamination
- Wash hands before and after use. Tilt the head back slightly and pull the lower eyelid down with the index finger to form a pouch. Squeeze the prescribed number of drops into the pouch. Close eyes to spread drops. To avoid excessive systemic absorption, apply finger pressure on the lacrimal sac for 1-2 min following use
- If more than one topical ophthalmic drug product is being used, the drugs should be administered at least 5 min apart
- To avoid contamination or the spread of infection, do not use dropper for more than one person, do not touch the eyelids or surrounding areas with the dropper tip of the bottle

carvedilol (Rx)

(kar-ved'i-lole)

Coreg, Coreg CR

Func. class.: Antihypertensive, α-/β-adrenergic blocker

Do not confuse:
carvedilol/captopril/carteolol

ACTION: A mixture of nonselective α-/β-adrenergic blocking activity; decreases cardiac output, exercise-induced tachycardia, reflex orthostatic tachycardia; causes vasodilation, reduction in peripheral vascular resistance

USES: Essential hypertension alone or in combination with other antihypertensives, CHF, LV dysfunction after MI, cardiomyopathy
Unlabeled uses: Angina, pediatric patients

CONTRAINDICATIONS: Hypersensitivity, asthma, class IV decompensated cardiac failure, 2nd- or 3rd-degree heart block, cardiogenic shock, severe bradycardia, pulmonary edema
Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, cardiac failure, hepatic injury, peripheral vascular disease, anesthesia, major surgery, diabetes mellitus, thyrotoxicosis, emphysema, chronic bronchitis, renal disease

Black Box Warning: Abrupt discontinuation

DOSAGE AND ROUTES

Essential hypertension
• **Adult: PO** 6.25 mg bid × 7-14 days; if tolerated well, then increase to 12.5 mg bid × 7-14 days; if tolerated well, may be increased (if needed) to 25 mg bid; not to exceed 50 mg/day; **EXT REL** cap 20 mg/day, may increase after 7-14 days to 40 mg/day

Congestive heart failure
• **Adult: PO** 3.125 mg bid × 2 wk; if tolerated well, give 6.25 mg bid × 2 wk, then double q2wk to max dose of 25 mg bid <85 kg or 50 mg bid >85 kg; **EXT REL** caps (Coreg CR) 10 mg/day × 2 wk, increase to 20, 40, 80 mg/day over successive intervals of 2 wk

Postmyocardial infarction
• **Adult: PO** 6.25 mg bid with food × 3-10 days, lower starting dose may be used if indicated; titrate upward as tolerated; may increase to 12.5 mg bid then titrate to 25 mg bid; **PO EXT REL** 20 mg daily with food, lower starting dose of 10 mg/day may be used, titrate upward after 3-10 days, increase to 40 mg daily as required

Angina (unlabeled)
• **Adult: PO** 25-50 mg bid

Available forms: Tabs 3.125, 6.25, 12.5, 25 mg; ext rel cap 10, 20, 40, 80 mg

Administer:
• With food in morning; tabs may be crushed or swallowed whole; give ext rel every AM with food; do not break, crush, chew ext rel cap; separate alcohol (including OTC products that contain ethanol) by ≥2 hr; caps may be opened and sprinkled over applesauce

Black Box Warning: Do not discontinue before surgery

SIDE EFFECTS

CNS: *Dizziness,* fatigue, weakness, somnolence, insomnia, ataxia, hyperesthesia, paresthesia, vertigo, depression, headache
CV: Bradycardia, *postural hypotension,* dependent edema, peripheral edema, AV block, extrasystoles, hypo/hypertension, palpitations, peripheral ischemia, CHF, pulmonary edema
GI: *Diarrhea,* abdominal pain, increased alk phos, ALT, AST
GU: Decreased libido, *impotence,* UTI
INTEG: Rash

MISC: Injury, back pain, viral infection, hypertriglyceridemia, thrombocytopenia, *hyperglycemia*
RESP: Rhinitis, pharyngitis, dyspnea, bronchospasm, cough, lung edema

PHARMACOKINETICS

Peak 1-2 hr; readily and extensively absorbed PO; >98% protein binding; extensively metabolized by liver; excreted through bile into feces; terminal half-life 7-10 hr with increases in geriatric patients, hepatic disease

INTERACTIONS

Increase: conduction disturbances—calcium channel blockers
Increase: bradycardia, hypotension—levodopa, MAOIs, reserpine
Increase: hypoglycemia—antidiabetic agents
Increase: concentrations of digoxin, cycloSPORINE, CYP2D6 inhibitors (FLUoxetine, quiNIDine)
Increase: toxicity of carvedilol—cimetidine, other antihypertensives, nitrates, acute alcohol ingestion
Decrease: heart rate, B/P—cloNIDine
Decrease: carvedilol levels—rifampin, NSAIDs, thyroid medications

Drug/Herb
Increase: antihypertensive effect—hawthorn
Decrease: antihypertensive effect—ephedra (ma huang)

Drug/Lab Test
Increase: blood glucose, BUN, potassium, triglycerides, uric acid, bilirubin, cholesterol, creatinine
Decrease: sodium, HDL

NURSING CONSIDERATIONS

Assess:
• **Hypertension:** B/P when beginning treatment, periodically thereafter; pulse: note rate, rhythm, quality; apical/radial pulse before administration; notify prescriber of significant changes
• **CHF:** edema in feet, legs daily; fluid overload: dyspnea, weight gain, jugular venous distention, fatigue, crackles

Evaluate:
• Therapeutic response: decreased B/P with hypertension

Teach patient/family:
• To comply with dosage schedule even if feeling better; that improvement may take several weeks
• To rise slowly to sitting or standing position to minimize orthostatic hypotension
• To report bradycardia, dizziness, confusion, depression, fever, weight gain, SOB, cold extremities, rash, sore throat, bleeding, bruising
• To weigh, take pulse, B/P at home; to advise if weight gain of >2 lb/day or 5 lb/wk and when to notify prescriber

Black Box Warning: Not to discontinue product abruptly; to taper over 1-2 wk; life-threatening dysrhythmias may occur

• To avoid hazardous activities until stabilized on medication; dizziness may occur
• To avoid all OTC medications unless approved by prescriber
• To carry emergency ID with product name, prescriber information at all times
• To inform all health care providers of products, supplements taken
• To report if pregnancy is planned or suspected, pregnancy (C) avoid breastfeeding

caspofungin (Rx)

(cas-po-fun'gin)

Cancidas

Func. class.: Antifungal, systemic

Chem. class.: Echinocandin

ACTION: Inhibits an essential component in fungal cell walls; causes direct damage to fungal cell wall

USES: Treatment of invasive aspergillosis and candidemia that has not responded to other treatment, including peritonitis, intraabdominal abscesses; susceptible species: *Aspergillus flavus, A. fumigatus, A. terreus, Candida albicans, C. glabrata, C. krusei, C. lusitaniae, C. parapsilosis, C. tropicalis,* esophageal candidiasis; empirical therapy for presumed fungal infection in febrile, neutropenic patients

Unlabeled uses: *Aspergillus niger,* fungal infections in premature neonates, neonates, infants, children <2 yr

CONTRAINDICATIONS: Hypersensitivity to this product, other echinocandins, including mannitol

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, severe hepatic disease

DOSAGE AND ROUTES

- **Adult: IV** loading dose 50-70 mg on day 1 then 50 mg/day maintenance dose, depending on condition; max 70 mg/day
- **Adolescent/child/infant ≥3 mo: IV INF** 70 mg/m² loading dose then 50 mg/m²/day; max 70 mg/day
- **Neonate and infant <3 mo (unlabeled): IV** 25 mg/m²/day

Esophageal candidiasis

- **Adult: IV** 50 mg × 7-14 days over 1 hr
- **Child:** 3 mo-17 yr: **IV** 70 mg/m² may increase to max 70 mg/m²

Available forms: Powder for inj 50, 70 mg

Administer:

- Do not mix or coinfuse with other medications, do not use dextrose-containing products to dilute, do not give as bolus

Intermittent IV INF route

- Allow to warm to room temp
- May administer loading dose on day 1
- **Reconstitute** 50-mg vial or 70-mg vial with 10.8 ml 0.9% NaCl, sterile water for inj or bacteriostatic water for inj (5 mg/ml or 7 mg/ml); **swirl** to dissolve, withdraw 10 ml reconstituted sol, and **further dilute** with 250 ml 0.9% NaCl, 0.45% NaCl, 0.225% NaCl, RL; **run** over 1 hr or more

SIDE EFFECTS

CNS: Dizziness, *headache*

CV: Sinus tachycardia

GI: Abdominal pain, *nausea, anorexia, vomiting, diarrhea, increased AST/ALT, alk phos*

HEMA: Thrombophlebitis, vasculitis, anemia

INTEG: *Rash, pruritus, inj site pain*

META: Hypokalemia

MS: Myalgia

RESP: Acute respiratory distress syndrome (ARDS)

SYST: Anaphylaxis

PHARMACOKINETICS

Metabolized in liver to inactive metabolites; excretion in feces, urine; phase II terminal half-life 9-11 hr; phase III terminal half-life 40-50 hr; protein binding 97%

INTERACTIONS

Increase: caspofungin levels—cycloSPORINE; may need dosage reduction

Decrease: levels of tacrolimus, sirolimus

Decrease: caspofungin levels—carBAMazepine, dexamethasone, efavirenz, nelfinavir, nevirapine, phenytoin, rifampin

Drug/Lab Test

Increase: AST, ALT, RBC, eosinophils

Decrease: HCT/Hgb, WBC, potassium

NURSING CONSIDERATIONS

Assess:

• **Infection;** clearing of cultures during treatment; obtain culture at baseline, throughout treatment; product may be started as soon as culture is taken (esophageal candidiasis); monitor cultures during HSCT for prevention of *Candida* infections

• Hepatic studies before, during treatment: bilirubin, AST, ALT, alk phos, as needed; obtain baseline renal studies

• **Hypersensitivity:** rash, pruritus, facial swelling; also for phlebitis

• GI symptoms: frequency of stools, cramping; if severe diarrhea occurs, electrolytes may need to be given

Perform/provide:

• Storage at room temp for up to 24 hr or refrigerated for 48 hr; store reconstituted sol at room temp for 1 hr before preparation of sol for administration

Evaluate:

• Therapeutic response: decreased symptoms of *Candida, Aspergillus* infections

Teach patient/family:

• To notify prescriber if pregnancy is suspected or planned

• To inform prescriber of renal/hepatic disease

• To report bleeding, facial swelling, wheezing, difficulty breathing, itching, rash, hives, increasing warmth, flushing; anaphylaxis can occur

cefaclor
See cephalosporins—2nd generation

cefadroxil

ceFAZolin
See cephalosporins—1st generation

cefdinir

cefditoren pivoxil

cefepime

cefixime

cefotaxime
See cephalosporins—3rd generation

cefoTEtan

cefOXitin
See cephalosporins—2nd generation

cefpodoxime
See cephalosporins—3rd generation

cefprozil
See cephalosporins—2nd generation

cefTAZidime

ceftibuten

ceftizoxime

cefTRIAXone
See cephalosporins—3rd generation

cefuroxime
See cephalosporins—2nd generation

ceftaroline (Rx)

(sef-tar'oh-leen)

Teflaro

Func. class.: Cephalosporin action: Inhibits cell wall synthesis through binding to essential penicillin-binding protein (PBPs)

USES: Acute bacterial skin/skin structure infections (ABSSI), bacterial community-acquired pneumonia

CONTRAINDICATIONS: Cephalosporin hypersensitivity

Precautions: Child/infant/neonate, breastfeeding, elderly patients, antimicrobial resistance, carbapenem/penicillin hypersensitivity, coagulopathy, colitis, dialysis, diarrhea, GI disease, hypoprothrombinemia, IBS, pregnancy (B), pseudomembranous colitis, renal disease, ulcerative colitis, viral infection, vit K deficiency

DOSAGE AND ROUTES

• **Adult: IV** 600 mg q12hr × 5-14 days (skin/skin-structure infections) or × 5-7 days (bacterial community-acquired pneumonia)

Renal dose

• **Adult: IV** CCr >30-≤50 ml/min, 400 mg q12hr; CCr ≥15-≤30 ml/min, 300 mg q12hr, CCr ≤15 ml/min, 200 mg q12hr

Available forms: Powder for inj 400 mg, 600 mg

Administer:

• Obtain C&S before use

Intermittent IV INF route

• Visually inspect for particulate matter, discoloration if sol or container permits

• **Reconstitute:** add 20 ml of sterile water to 400- or 600-mg vial (20 ml/ml for 400 mg; 30 mg/ml for 600 mg), mix gently until dissolved; **dilute** in 250 ml of 0.9% NaCl, 0.45% NaCl, LR, D_5, D2.5, **give** over 1 hr, do not admix, use within 6 hr at room temp or 24 hr refrigerated

SIDE EFFECTS

CV: Phlebitis

ENDO: Hypokalemia

GI: Diarrhea, nausea, vomiting, constipation, abdominal pain, pseudomembranous colitis (rare)

INTEG: Rash, anaphylaxis

PHARMACOKINETICS

Protein binding 20%; excreted in urine 88%, feces 6%; half-life 2.66 hr; not hepatically metabolized

INTERACTIONS

Increase: prothrombin time risk—anticoagulants

Drug/Lab Test

Increase: LFTs

Decrease: potassium, eosinophils

NURSING CONSIDERATIONS

Assess:

• **Infection:** vital signs, sputum, WBC before, during therapy

• **Hypersensitivity:** before use, obtain a history of hypersensitivity reactions to cephalosporins, carbapenems, penicillins; cross-sensitivity may occur

• **Anaphylaxis (rare):** rash, pruritus, laryngeal edema, dyspnea, wheezing; discontinue product, notify health care provider immediately, keep emergency equipment nearby

• **Pseudomembranous colitis:** diarrhea, abdominal pain, fever, bloody stools; report immediately if these occur; may occur several weeks after terminating therapy

• Monitor BUN, creatinine baseline, periodically; elderly and those with renal disease are at greater risk of renal dysfunction

Evaluate:

• Therapeutic response: negative C&S, resolution of symptoms of infection

Teach patient/family:

• About the reason for treatment and expected result

• To immediately report rash, itching, difficulty breathing, bloody diarrhea, fever, abdominal pain

C

⚠ HIGH ALERT

celecoxib (Rx)

(sel-eh-cox'ib)

CeleBREX

Func. class.: Nonsteroidal antiinflammatory, antirheumatic

Chem. class.: COX-2 inhibitor

Do not confuse:
CeleBREX/CeleXA/Cerebra/Cerebyx

ACTION: Inhibits prostaglandin synthesis by selectively inhibiting cyclooxygenase-2 (COX-2), an enzyme needed for biosynthesis

USES: Acute, chronic rheumatoid arthritis, osteoarthritis, acute pain, primary dysmenorrhea, ankylosing spondylitis, juvenile rheumatoid arthritis (JRA)
Unlabeled uses: Colorectal adenoma prophylaxis

CONTRAINDICATIONS: Pregnancy (D) 3rd trimester; hypersensitivity to salicylates, iodides, other NSAIDs, sulfonamides

Black Box Warning: CABG

Precautions: Pregnancy (C) 1st/2nd trimesters, breastfeeding, children <18 yr, geriatric patients, bleeding, GI/renal/hepatic/cardiac disorders, PVD, hypertension, severe dehydration, asthma

Black Box Warning: GI bleeding/perforation, peptic ulcer disease, MI, stroke

DOSAGE AND ROUTES

Do not exceed recommended dose; deaths have occurred

Acute pain/primary dysmenorrhea
- **Adult: PO** 400 mg initially, then 200 mg if needed on 1st day, then 200 mg bid prn on subsequent days; start with ½ dose for poor CYP2C9 metabolizers

Osteoarthritis
- **Adult: PO** 200 mg/day as a single dose or 100 mg bid; start with ½ dose for poor CYP2C9 metabolizers
- **Geriatric: PO** use lowest possible dose

Rheumatoid arthritis
- **Adult: PO** 100-200 mg bid; start with ½ dose for poor CYP2C9 metabolizers

Ankylosing spondylitis
- **Adult: PO** 200 mg/day or in divided doses (bid); start with ½ dose for poor CYP2C9 metabolizers

Juvenile rheumatoid arthritis (JRA)
- **Adolescent and child ≥2 yr (>25 kg): PO** 100 mg bid; start with ½ dose for poor CYP2C9 metabolizers
- **Child ≥2 yr (10-25 kg): PO** 50 mg bid; start with ½ dose for poor CYP2C9 metabolizers

Hepatic disease
- **Adult: PO** (Child-Pugh B) reduce dose by 50%

Colorectal adenoma prophylaxis (unlabeled)
- **Adult: PO** 400 mg bid × 6 mo

Available forms: Caps 50, 100, 200, 400 mg

Administer:
- Do not break, crush, chew, or dissolve caps with a full glass of water to enhance absorption; caps may be opened into applesauce or soft food, ingest immediately with water
- With food, milk to decrease gastric symptoms (with higher doses [400 mg bid]); do not increase dose

SIDE EFFECTS

CNS: *Fatigue, anxiety, depression, nervousness, paresthesia,* dizziness, insomnia
CV: Stroke, MI, tachycardia, CHF, angina, palpitations, dysrhythmias, hypertension, fluid retention
EENT: Tinnitus, hearing loss, blurred vision, glaucoma, cataract, conjunctivitis, eye pain
GI: Nausea, anorexia, vomiting, constipation, dry mouth, diverticulitis, gastritis,

gastroenteritis, hemorrhoids, hiatal hernia, stomatitis, GI bleeding/ulceration
GU: Nephrotoxicity: *dysuria*, hematuria, oliguria, azotemia, cystitis, UTI, renal papillary necrosis
HEMA: Blood dyscrasias, epistaxis, bruising, anemia, platelet aggregation
INTEG: Serious (sometimes fatal) Stevens-Johnson syndrome, toxic epidermal necrolysis, purpura, rash, pruritus, sweating, erythema, petechiae, photosensitivity, alopecia
RESP: Pharyngitis, SOB, pneumonia, coughing

PHARMACOKINETICS

Well absorbed, crosses placenta, bound to plasma proteins, metabolized by CYP2C9 in liver, very little excreted by kidneys/in feces, peak 3 hr, half-life 11 hr, protein binding ~97%

INTERACTIONS

Increase: bleeding risk—anticoagulants, SSRIs, antiplatelets, thrombolytics, salicylates, alcohol
Increase: adverse reactions—glucocorticoids, NSAIDs, aspirin
Increase: toxicity—lithium, antineoplastics, bisphosphonates
Increase: celecoxib blood level—fluconazole
Decrease: effect of aspirin, ACE inhibitors, thiazide diuretics, furosemide
Drug/Herb
Decrease: effect of feverfew
Increase: bleeding risk—garlic, ginger, ginkgo
Drug/Lab Test
Increase: ALT, AST, BUN, cholesterol, glucose, potassium, sodium
Decrease: glucose, sodium, WBC, platelets

NURSING CONSIDERATIONS

Assess:
• **Pain** of rheumatoid arthritis, osteoarthritis; check ROM, inflammation of joints, characteristics of pain

Black Box Warning: For cardiac disease that may be worse after taking product; MI, stroke; do not use with coronary artery bypass graft (CABG)

• CBC during therapy; watch for decreasing platelets; if low, therapy may need to be discontinued, restarted after hematologic recovery; LFTs, serum creatinine/BUN, stool guaiac

Black Box Warning: For blood dyscrasias (thrombocytopenia): bruising, fatigue, bleeding, poor healing

• **GI toxicity:** black, tarry stools; abdominal pain
⚠ **Serious skin disorders:** Stevens-Johnson syndrome, toxic epidermal necrolysis; may be fatal

Evaluate:
• Therapeutic response: decreased pain, inflammation in arthritic conditions; decreased number of polyps

Teach patient/family:

Black Box Warning: Not to exceed recommended dose; to notify prescriber immediately of chest pain, skin eruptions; to stop product if these occur

• To check with prescriber to determine when product should be discontinued prior to surgery
• That product must be continued for prescribed time to be effective; to avoid other NSAIDs, aspirin, sulfonamides

Black Box Warning: To notify prescriber of GI symptoms: black, tarry stools; cramping or rash; edema of extremities; weight gain

Black Box Warning: To report bleeding, bruising, fatigue, malaise because blood abnormalities do occur

• To report possible respiratory infection: fever, SOB, coughing, painful swallowing
• To report if pregnancy is planned or suspected, pregnancy (C) before 3 wk, (D) after 30 wk

cephalexin

See cephalosporins—1st generation

CEPHALOSPORINS—1ST GENERATION

cefadroxil (Rx)
(sef-a-drox'ill)
Apo-Cefadroxil ✱

ceFAZolin (Rx)
(sef-a'zoe-lin)

cephalexin (Rx)
(sef-a-lex'in)
Keflex, Panixine
Func. class.: Antiinfective
Chem. class.: Cephalosporin (1st generation)

Do not confuse:
cephalexin/cefaclor

ACTION: Inhibits bacterial cell wall synthesis; renders cell wall osmotically unstable, leads to cell death; lysis mediated by cell wall autolytic enzymes

USES:

cefadroxil: Gram-negative bacilli: *Escherichia coli, Proteus mirabilis, Klebsiella* (UTI only); gram-positive organisms: *Streptococcus pneumoniae, Streptococcus pyogenes, Staphylococcus aureus;* upper, lower respiratory tract, urinary tract, skin infections; otitis media; tonsillitis; UTIs

ceFAZolin: Gram-negative bacilli: *Haemophilus influenzae, Escherichia coli, Proteus mirabilis, Klebsiella;* gram-positive organisms: *Staphylococcus aureus;* upper, lower respiratory tract, urinary tract, skin infections; bone, joint, biliary, genital infections; endocarditis, surgical prophylaxis, septicemia

cephalexin: Gram-negative bacilli: *Haemophilus influenzae, Escherichia coli, Proteus mirabilis, Klebsiella;* gram-positive organisms: *Streptococcus pneumoniae, Streptococcus pyogenes, Staphylococcus aureus;* upper, lower respiratory tract, urinary tract, skin, bone infections; otitis media

CONTRAINDICATIONS: Hypersensitivity to cephalosporins, infants <1 mo

Precautions: Pregnancy (B), breastfeeding, hypersensitivity to penicillins, renal disease

DOSAGE AND ROUTES

cefadroxil

- **Adult: PO** 1-2 g/day or divided q12hr; loading dose of 1 g initially
- **Child: PO** 30 mg/kg/day in divided doses bid, max 2 g/day

Renal dose

- **Adult: PO** CCr 25-50 ml/min, 500 mg q12hr; CCr 10-24 ml/min, 500 mg q24hr; CCr <10 ml/min, 500 mg q36hr

Available forms: Caps 500 mg; tabs 1 g; oral susp 250, 500 mg/5 ml

cefazolin

Life-threatening infections

- **Adult: IM/IV** 1-2 g q6-8hr; max 12 g/day
- **Child >1 mo: IM/IV** 75-100 mg/kg in 3-4 divided doses; max 6 g/day

Mild/moderate infections

- **Adult: IM/IV** 250 mg-1 g q8hr, max 12 g/day
- **Child >1 mo: IM/IV** 25-50 mg/kg in 3-4 equal doses, max 6 g/day, or 2 g as a single dose

Renal dose

- **Adult: IM/IV** after loading dose, CCr 35-54 ml/min, dose q8hr; CCr 10-34 ml/min, 50% of dose q12hr; CCr <10 ml/min, 50% of dose q18-24hr
- **Child: IM/IV** CCr >70 ml/min, no dosage adjustment; CCr 40-70 ml/min after loading dose, reduce dose to 7.5-30 mg/kg q12hr; CCr 20-39 ml/min, give 3.125-12.5 mg/kg after loading dose q12hr; CCr 5-19 ml/min, 2.5-10 mg/kg after loading dose q24hr

Available forms: Inj 250, 500 mg, 1, 5, 10, 20 g; inf 500 mg, 1 g/50-ml vial

cephalexin

Moderate infections

- **Adult: PO** 250-500 mg q6hr, max 4 g/day
- **Child: PO** 25-50 mg/kg/day in 4 equal doses, max 4 g/day

Moderate skin infections

- **Adult: PO** 500 mg q12hr

Endocarditis prophylaxis

- 2 g 1 hr before procedure

Severe infections

- **Adult: PO** 500 mg-1 g q6hr
- **Child: PO** 50-100 mg/kg/day in 4 equal doses, max 4 g/day

Renal dose

- **Adult: PO** CCr 10-40 ml/min, 250-500 mg then 250-500 mg q8-12hr; CCr <10 ml/min, 250-500 mg then 250-500 mg q12-24hr

Available forms: Caps 250, 500 mg; tabs 250, 500 mg, 1 g; oral susp 125 mg, 250 mg/5 ml

Administer:

cefadroxil

- For 10-14 days to ensure organism death, prevent superinfection
- With food if needed for GI symptoms
- Shake susp, refrigerate, discard after 2 wk
- After C&S completed

ceFAZolin

IV route

- Check for irritation, extravasation often; dilute in 10 ml sterile water for inj, run over 3-5 min; may be further diluted with 50-100 ml of NS, D_5W sol, run over ½-1 hr by Y-tube or 3-way stopcock
- For 10-14 days to ensure organism death, prevent superinfection
- After C&S completed

Syringe compatibilities: DimenhyDRINATE, heparin, vit B complex

Y-site compatibilities: Acyclovir, alfentanil, allopurinol, alprostadil, amifostine, amikacin, aminocaproic acid, aminophylline, amphotericin B liposome, anidulafungin, ascorbic acid injection, atenolol, atracurium, atropine, aztreonam, benztropine, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium gluconate, CARBOplatin, cefamandole, cefmetazole, cefonicid, cefoperazone, cefoTEtan, cefOXitin, cefpirome, ceftAZidime, ceftizoxime, ceftRIAXone, cefuroxime, cephalothin, cephapirin, chloramphenicol, cimetidine, CISplatin, clindamycin, codeine, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, dexmedetomidine, digoxin, diltiazem, DOCEtaxel, doxacurium, doxapram, DOXOrubicin liposomal, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, epoetin alfa, eptifibatide, esmolol, etoposide, fenoldopam, fentaNYL, filgrastim, fluconazole, fludarabine, fluorouracil, folic acid (as sodium salt), foscarnet, furosemide, gallium, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, heparin, hydrocortisone, hydrOXYzine, IDArubicin, ifosfamide, imipenem-cilastatin, indomethacin, insulin (regular), irinotecan, isoproterenol, ketorolac, lidocaine, linezolid, LORazepam, LR's injection, mannitol, mechlorethamine, melphalan, meperidine, metaraminol, methicillin, methotrexate, methoxamine, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, mezlocillin, miconazole, midazolam, milrinone, morphine, moxalactam, multiple vitamins injection, nafcillin, nalbuphine, naloxone, nesiritide, niCARdipine, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxacillin, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pamidronate, pancuronium, pantoprazole, penicillin G potassium/sodium, peritoneal dialysis solution, perphenazine, PHENobarbital, phenylephrine, phytonadione, piperacillin, Plasma-Lyte M in dextrose 5%, polymyxin B, potassium chloride, procainamide, propofol, propranolol, ranitidine, remifentanil, Ringer's injection, ritodrine, riTUXimab, sargramostim, sodium acetate, sodium bicarbonate, succinylcholine, SUFentanil,

tacrolimus, teniposide, tenoxicam, theophylline, thiamine, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, TNA, tolazoline, trastuzumab, trimetaphan, urokinase, vasopressin, vecuronium, verapamil, vinCRIStine, vitamin B complex with C, voriconazole, warfarin

cephalexin

- Shake susp, refrigerate, discard after 2 wk
- For 10-14 days to ensure organism death, prevent superinfection
- With food if needed for GI symptoms
- After C&S

SIDE EFFECTS

CNS: Headache, dizziness, weakness, paresthesia, fever, chills, seizures (with high doses)

GI: Nausea, vomiting, *diarrhea, anorexia,* pain, glossitis, bleeding; increased AST, ALT, bilirubin, LDH, alk phos; abdominal pain, pseudomembranous colitis

GU: Proteinuria, vaginitis, pruritus, candidiasis, increased BUN, nephrotoxicity, renal failure

HEMA: Leukopenia, thrombocytopenia, agranulocytosis, anemia, neutropenia, lymphocytosis, eosinophilia, pancytopenia, hemolytic anemia

INTEG: Rash, urticaria, dermatitis

RESP: Dyspnea

SYST: Anaphylaxis, serum sickness, superinfection, Stevens-Johnson syndrome

PHARMACOKINETICS

cefadroxil: Peak 1-1½ hr, duration 12-24 hr, half-life 1-2 hr, 20% bound by plasma proteins, crosses placenta, excreted in breast milk

cefazolin

IM: Peak ½-2 hr, duration 6-12 hr, half-life 1½-2¼ hr

IM: Peak 10 min, duration 6-12 hr, eliminated unchanged in urine, 75%-85% protein bound

cephalexin: Peak 1 hr, duration 6-12 hr, half-life 30-72 min, 5%-15% bound by plasma proteins, 80%-100% eliminated unchanged in urine, crosses placenta, excreted in breast milk

INTERACTIONS

Increase: prothrombin time—anticoagulants; use cautiously

Increase: toxicity—aminoglycosides, loop diuretics, probenecid

Drug/Lab Test

Increase: AST, ALT, alk phos, LDH, BUN, creatinine, bilirubin

False positive: urinary protein, direct Coombs' test, urine glucose

Interference: cross-matching

NURSING CONSIDERATIONS

Assess:

- Sensitivity to penicillin and other cephalosporins
- **Nephrotoxicity:** increased BUN, creatinine; urine output: if decreasing, notify prescriber
- I&O daily
- Blood studies: AST, ALT, CBC, Hct, bilirubin, LDH, alk phos, Coombs' test monthly if patient is on long-term therapy
- Electrolytes: potassium, sodium, chlorine monthly if patient is on long-term therapy
- **Pseudomembranous colitis:** bowel pattern daily; if severe diarrhea occurs, product should be discontinued
- **Anaphylaxis:** rash, urticaria, pruritus, chills, fever, joint pain; angioedema; may occur a few days after therapy begins; discontinue product, notify prescriber immediately, keep emergency equipment nearby
- Bleeding: ecchymosis, bleeding gums, hematuria, stool guaiac daily
- **Overgrowth of infection:** perineal itching, fever, malaise, redness, pain, swelling, drainage, rash, diarrhea, change in cough, sputum

Evaluate:

- Therapeutic response: decreased symptoms of infection, negative C&S

Teach patient/family:

- To use yogurt or buttermilk to maintain intestinal flora, decrease diarrhea

• To take all medication prescribed for length of time ordered
⚠ To report sore throat, bruising, bleeding, joint pain (may indicate **blood dyscrasias** [rare]); diarrhea with mucus, blood (may indicate **pseudomembranous colitis**)

TREATMENT OF ANAPHYLAXIS: EPINEPHrine, antihistamines; resuscitate if needed

CEPHALOSPORINS—2ND GENERATION

cefaclor (Rx)
(sef'a-klor)
Ceclor, Raniclor

cefoTEtan (Rx)
(sef'oh-tee-tan)
Cefotan

cefOXitin (Rx)
(se-fox'i-tin)
Mefoxin

cefprozil (Rx)
(sef-proe'zill)
Cefzil

cefuroxime (Rx)
(sef-yoor-ox'eem)
Ceftin, Zinacef

Func. class.: Antiinfective
Chem. class.: Cephalosporin (2nd generation)

Do not confuse:
cefaclor/cephalexin
Cefotan/Ceftin
cefprozil/ceFAZolin/cefuroxime
Cefzil/Ceftin

ACTION: Inhibits bacterial cell wall synthesis, renders cell wall osmotically unstable, leads to cell death by binding to cell wall membrane

USES:
cefaclor: Gram-negative bacilli: *Haemophilus influenzae, Escherichia coli, Proteus mirabilis, Klebsiella;* gram-positive organisms: *Streptococcus pneumoniae, Streptococcus pyogenes, Staphylococcus aureus;* respiratory tract, urinary tract, skin, bone, joint infections; otitis media
cefoTEtan: Gram-negative organisms: *Haemophilus influenzae, Escherichia coli, Enterobacter aerogenes, Proteus mirabilis, Klebsiella, Citrobacter, Salmonella, Shigella, Acinetobacter, Bacteroides fragilis, Neisseria, Serratia;* gram-positive organisms: *Streptococcus pneumoniae, Streptococcus pyogenes, Staphylococcus aureus;* upper and lower, serious respiratory tract, urinary tract, skin, bone, joint, gynecologic, gonococcal, intraabdominal infections
cefOXitin: Gram-negative bacilli: *Haemophilus influenzae, Escherichia coli, Proteus, Klebsiella, Bacteroides fragilis, Neisseria gonorrhoeae;* gram-positive organisms: *Streptococcus pneumoniae, Streptococcus pyogenes, Staphylococcus aureus;* anaerobes including *Clostridium;* lower respiratory tract, urinary tract, skin, bone, gynecologic, gonococcal infections; septicemia, peritonitis
cefprozil: Pharyngitis/tonsillitis; otitis media; secondary bacterial infection of acute bronchitis; acute bacterial exacerbation of chronic bronchitis; uncomplicated skin and skin-structure infections; acute sinusitis
cefuroxime: Gram-negative bacilli: *Haemophilus influenzae, Escherichia coli, Neisseria, Proteus mirabilis, Klebsiella;* gram-positive organisms: *Streptococcus pneumoniae, Streptococcus pyogenes, Staphylococcus aureus;* serious lower respiratory tract, urinary tract, skin, bone, joint, gonococcal infections; septicemia, meningitis

CONTRAINDICATIONS: Hypersensitivity to cephalosporins or related antibiotics; seizures

Precautions: Pregnancy (B), breast-feeding, children, GI/renal disease

DOSAGE AND ROUTES

cefaclor

- **Adult: PO** 250-500 mg q8hr, max 4 g/day
- **Child >1 mo: PO** 20-40 mg/kg/day in divided doses q8hr or total daily dose may be divided and given q12hr, max 1 g/day

Available forms: Caps 250, 500 mg; oral susp 125, 187, 250, 375 mg/5 ml; chew tabs (Raniclor) 250, 375 mg

cefoTEtan

- **Adult: IM/IV** 1-2 g q12hr × 5-10 days

Renal dose

- **Adult: IM/IV** CCr 10-30 ml/min, give dose q24hr or ½ dose q12hr; CCr <10 ml/min, give dose q48hr or ½ dose q24hr

Perioperative prophylaxis

- **Adult: IV** 1-2 g ½-1 hr before surgery

Available forms: Inj 1, 2, 10 g

cefOXitin

- **Adult: IM/IV** 1-2 g q6-8hr

Renal dose

- **Adult: IM/IV** after loading dose, CCr 30-50 ml/min, 1-2 g q8-12hr; CCr 10-29 ml/min, 1-2 g q12-24hr; CCr <10 ml/min, 0.5-1 g q12-24hr

Uncomplicated gonorrhea (outpatient)

- **Adult/adolescent/child ≥45 kg: IM** 2 g as single dose with 1 g **PO** probenecid at same time

Severe infections

- **Adult: IM/IV** 2 g q4hr
- **Child ≥3 mo: IM/IV** 80-160 mg/kg/day divided q4-6hr; max 12 g/day

Available forms: Powder for inj 1, 2, 10 g

cefprozil

Renal dose

- CCr <30 ml/min, 50% of dose

Upper respiratory infections

- **Adult: PO** 500 mg q24hr × 10 days

Otitis media

- **Child 6 mo-12 yr: PO** 15 mg/kg q12hr × 10 days

Lower respiratory infections

- **Adult: PO** 500 mg q12hr × 10 days

Skin/skin-structure infections

- **Adult: PO** 250-500 mg q12hr × 10 days

Available forms: Tabs 250, 500 mg; susp 125, 250 mg/5 ml

cefuroxime

- **Adult and child: PO** 250 mg q12hr; may increase to 500 mg q12hr for serious infections
- **Adult: IM/IV** 750 mg-1.5 g q8hr for 5-10 days

Urinary tract infections

- **Adult: PO** 125 mg q12hr; may increase to 250 mg q12hr if needed

Otitis media

- **Child <2 yr: PO** 125 mg bid
- **Child >2 yr: PO** 250 mg bid

Surgical prophylaxis

- **Adult: IV** 1.5 g ½-1 hr before surgery

Severe infections

- **Adult: IM/IV** 1.5 g q6hr; may give up to 3 g q8hr for bacterial meningitis
- **Child >3 mo: IM/IV** 50-100 mg/kg/day or IM in divided doses q6-8hr

Uncomplicated gonorrhea

- **Adult: IM** 1.5 g as single dose in 2 separate sites with oral probenecid

Renal dose

- Dosage reduction indicated with severe renal impairment (CCr <20 ml/min)

Available forms: Tabs 125, 250, 500 mg; inj 150, 750 mg, 1.5, 7.5 g; inj 750 mg; 1.5 g powder; susp 125, 250 mg/5 ml

Administer:

- Do not break, crush, or chew ext rel tabs or caps
- On an empty stomach 1 hr before or 2 hr after a meal

cefaclor

- Shake susp, refrigerate, discard after 2 wk
- For 10-14 days to ensure organism death, prevent superinfection
- With food if needed for GI symptoms
- After C&S completed

cefoTEtan

- IV direct after diluting 1 g/10 ml sterile water for inj, give over 3-5 min; may be diluted further with 50-100 ml NS or D_5W, shake; run over 1/2-1 hr by Y-tube or 3-way stopcock; discontinue primary inf during administration
- May be stored 96 hr refrigerated or 24 hr at room temp

Y-site compatibilities: Allopurinol, amifostine, aztreonam, diltiazem, famotidine, filgrastim, fluconazole, fludarabine, heparin, insulin (regular), melphalan, meperidine, morphine, PACLitaxel, remifentanil, sargramostim, tacrolimus, teniposide, theophylline, thiotepa

cefOXitin

IV route

- After diluting 1 g or less/10 ml or more D_5W, NS and give over 3-5 min; may be diluted further with 50-100 ml NS or D_5W; run over 1/2-1 hr by Y-tube or 3-way stopcock; discontinue primary inf during administration; give by cont inf at prescribed rate; may store 96 hr refrigerated or 24 hr at room temp
- For 10-14 days to ensure organism death, prevent superinfection
- After C&S completed

Syringe compatibilities: Heparin, insulin

Y-site compatibilities: Acyclovir, amifostine, amphotericin B cholesteryl sulfate complex, aztreonam, cyclophosphamide, diltiazem, DOXOrubicin liposome, famotidine, fluconazole, foscarnet, HYDROmorphone, magnesium sulfate, meperidine, morphine, ondansetron, perphenazine, remifentanil, teniposide, thiotepa

cefprozil

- For 10-14 days to ensure organism death, prevent superinfection
- After C&S
- Refrigerate/shake susp before use

cefuroxime

- For 10-14 days to ensure organism death, prevent superinfection
- With food if needed for GI symptoms
- After C&S obtained

Y-site compatibilities: Acyclovir, allopurinol, amifostine, atracurium, aztreonam, cyclophosphamide, diltiazem, famotidine, fludarabine, foscarnet, HYDROmorphone, melphalan, meperidine, morphine, ondansetron, pancuronium, perphenazine, remifentanil, sargramostim, tacrolimus, teniposide, thiotepa, vecuronium

SIDE EFFECTS

CNS: Dizziness, headache, fatigue, paresthesia, fever, chills, confusion

GI: *Diarrhea,* nausea, vomiting, anorexia, dysgeusia, glossitis, bleeding; increased AST, ALT, bilirubin, LDH, alk phos; abdominal pain, loose stools, flatulence, heartburn, stomach cramps, colitis, jaundice, pseudomembranous colitis

GU: Vaginitis, pruritus, candidiasis, increased BUN, nephrotoxicity, renal failure, pyuria, dysuria, reversible interstitial nephritis

HEMA: Leukopenia, thrombocytopenia, agranulocytosis, anemia, neutropenia, lymphocytosis, eosinophilia, pancytopenia, hemolytic anemia, leukocytosis, granulocytopenia

INTEG: Rash, urticaria, dermatitis, Stevens-Johnson syndrome

RESP: Dyspnea

SYST: Anaphylaxis, serum sickness, superinfection

PHARMACOKINETICS

cefaclor

PO: Peak 1/2-1 hr, half-life 36-54 min, 25% bound by plasma proteins, 60%-85% eliminated unchanged in urine in 8 hr, crosses placenta, excreted in breast milk (low concentrations)

cefoTEtan

IM/IV: Peak 1 1/2-3 hr, half-life 3-5 hr, 75%-90% bound by plasma proteins, 50%-80% eliminated unchanged in urine, crosses placenta, excreted in breast milk

cefOXitin

Half-life 0.75-1 hr; 65%-80% bound by plasma proteins; 90%-100% eliminated

unchanged in urine; crosses placenta, blood-brain barrier; eliminated in breast milk; not metabolized
IM: Peak 15-60 min
IV: Peak 3 min

cefprozil
PO: Peak 1.5 hr, protein binding 36%, elimination half-life 1.3 hr (normal renal function), 2 hr (hepatic disease), 5½-6 hr (end-stage renal disease), extensively metabolized to an active metabolite, eliminated in urine 60%

cefuroxime
Peak PO 2 hr, IM 45 min, IV 2-3 min, 66% excreted unchanged in urine, half-life 1-2 hr in normal renal function

INTERACTIONS

Increase: effect/toxicity—aminoglycosides, furosemide, probenecid
Increase: bleeding risk (cefotetan)—anticoagulants, thrombolytics, NSAIDs, antiplatelets, plicamycin, valproic acid
Decrease: absorption of cephalosporin—antacids
Decrease: effect of cephalosporin—H_2-blockers

Drug/Lab Test
False increase: creatinine (serum urine), urinary 17-KS
False positive: urinary protein, direct Coombs' test, urine glucose testing (Clinitest)
Interference: cross-matching

NURSING CONSIDERATIONS

Assess:
⚠ **Nephrotoxicity:** increased BUN, creatinine
• I&O ratio
• Blood studies: AST, ALT, CBC, Hct, bilirubin, LDH, alk phos, Coombs' test monthly if patient is on long-term therapy
• Electrolytes: potassium, sodium, chlorine monthly if patient is on long-term therapy
• Bowel pattern daily; if severe diarrhea occurs, product should be discontinued; may indicate pseudomembranous colitis
• Urine output; if decreasing, notify prescriber (may indicate nephrotoxicity)
⚠ **Anaphylaxis:** rash, flushing, urticaria, pruritus, dyspnea; discontinue product, notify prescriber, have emergency equipment available
• **Bleeding:** ecchymosis, bleeding gums, hematuria, stool guaiac daily
⚠ **Overgrowth of infection:** perineal itching, fever, malaise, redness, pain, swelling, drainage, rash, diarrhea, change in cough, sputum

Evaluate:
• Therapeutic response: negative C&S

Teach patient/family:
• If diabetic, to use blood glucose testing
• To complete full course of product therapy; to report persistent diarrhea
• To use yogurt, buttermilk to maintain intestinal flora, decrease diarrhea
• To notify prescriber if breastfeeding or of any side effects
⚠ To report sore throat, bruising, bleeding, joint pain (may indicate blood dyscrasias [rare]); diarrhea with mucus, blood (pseudomembranous colitis)

TREATMENT OF ANAPHYLAXIS: EPINEPHrine, antihistamines; resuscitate if needed

CEPHALOSPORINS—3RD/4TH GENERATION

cefdinir (Rx)
(sef'dih-ner)
Omnicef

cefditoren pivoxil (Rx)
(sef-dit'oh-ren pih-vox'il)
Spectracef

cefepime (Rx)
(sef'e-peem)
Maxipime (4th generation)

cefixime (Rx)
(sef-icks'ime)
Cefixime, Suprax

cefotaxime (Rx)
(sef-oh-taks'eem)
Claforan

cefpodoxime (Rx)
(sef-poe-docks'eem)
Vantin

ceftAZidime (Rx)
(sef'tay-zi-deem)
Ceptaz, Fortaz, Tazicef, Tazidime

ceftibuten (Rx)
(sef-ti-byoo'tin)
Cedax

ceftizoxime (Rx)
(sef-ti-zox'eem)
Cefizox

cefTRIAXone (Rx)
(sef-try-ax'one)
Rocephin

Func. class.: Broad-spectrum antibiotic
Chem. class.: Cephalosporin (3rd generation)

Do not confuse:
ceftAZidime/ceftizoxime
Vantin/Ventolin

ACTION: Inhibits bacterial cell wall synthesis, renders cell wall osmotically unstable, leads to cell death

USES:

C

cefdinir: Community-acquired pneumonia, otitis media, sinusitis, pharyngitis, skin and skin-structure infections, acute exacerbations of chronic bronchitis, gram-negative bacilli: *Haemophilus influenzae, Haemophilus parainfluenzae, Moraxella catarrhalis;* gram-positive organisms: *Streptococcus pneumoniae, Streptococcus pyogenes, Staphylococcus aureus* (MSSA)

cefditoren pivoxil: Acute bacterial exacerbations of chronic bronchitis caused by *Haemophilus influenzae, Haemophilus parainfluenzae, Streptococcus pneumoniae, Moraxella catarrhalis;* pharyngitis/tonsillitis caused by *Streptococcus pyogenes;* uncomplicated skin and skin-structure infections caused by *Staphylococcus aureus, Streptococcus pyogenes;* community-acquired pneumonia

cefepime: Gram-negative bacilli: *Escherichia coli, Proteus, Klebsiella;* gram-positive organisms: *Streptococcus pneumoniae, Streptococcus pyogenes, Staphylococcus aureus;* lower respiratory tract, urinary tract, skin, bone infections; febrile neutropenia intraabdominal infection

cefixime: Uncomplicated UTI *(Escherichia coli, Proteus mirabilis),* pharyngitis and tonsillitis *(Streptococcus pyogenes),* otitis media *(Haemophilus influenzae), Moraxella catarrhalis,* acute bronchitis and acute exacerbations of chronic bronchitis *(Streptococcus pneumoniae, H. influenzae),* uncomplicated gonorrhea

cefotaxime: Gram-negative organisms: *Haemophilus influenzae, Haemophilus parainfluenzae, Escherichia coli, Enterococcus faecalis, Neisseria gonorrhoeae, Neisseria meningitidis, Proteus mirabilis, Klebsiella, Citrobacter, Serratia, Salmonella, Shigella Pseudo-*

monas; gram-positive organisms: *Streptococcus pneumoniae, Streptococcus pyogenes, Staphylococcus aureus;* serious lower respiratory tract, urinary tract, skin, bone, gonococcal infections; bacteremia, septicemia, meningitis, skin, skin-structure infections; CNS infections; perioperative prophylaxis

cefpodoxime: Gram-negative bacilli: *Neisseria gonorrhoeae, Haemophilus influenzae, Escherichia coli, Proteus mirabilis, Klebsiella;* gram-positive organisms: *Streptococcus pneumoniae, Streptococcus pyogenes, Staphylococcus aureus;* upper and lower respiratory tract, urinary tract, skin infections; otitis media; sexually transmitted diseases

cefTAZidime: Gram-negative organisms: *Haemophilus influenzae, Escherichia coli, Enterobacter aerogenes, Pseudomonas aeruginosa, Proteus mirabilis, Klebsiella, Citrobacter, Enterobacter, Salmonella, Shigella, Acinetobacter, Bacteroides fragilis, Neisseria, Serratia;* gram-positive organisms: *Streptococcus pneumoniae, Streptococcus pyogenes, Staphylococcus aureus;* serious upper/lower respiratory tract, urinary tract, skin, gynecologic, bone, joint, intraabdominal infections; septicemia, meningitis, febrile neutropenia

ceftibuten: Pharyngitis/tonsillitis, otitis media, secondary bacterial infection of acute bronchitis

ceftizoxime: Gram-negative bacilli: *Haemophilus influenzae, Escherichia coli, Enterobacter aerogenes, Proteus mirabilis, Klebsiella, Enterobacter;* gram-positive organisms: *Streptococcus pneumoniae, Streptococcus pyogenes, Staphylococcus aureus;* serious lower respiratory tract, urinary tract, skin, intraabdominal infections; septicemia, meningitis, bone, joint infections; PID caused by *Neisseria gonorrhoeae*

cefTRIAXone: Gram-negative bacilli: *Haemophilus influenzae, Escherichia coli, Enterobacter aerogenes, Proteus mirabilis, Klebsiella, Citrobacter, Enterobacter, Salmonella, Shigella, Acinetobacter, Bacteroides fragilis, Neisseria, Serratia;* gram-positive organisms: *Streptococcus pneumoniae, Streptococcus pyogenes, Staphylococcus aureus;* serious lower respiratory tract, urinary tract, skin, gonococcal, intraabdominal infections; septicemia, meningitis, bone, joint infections; otitis media; PID

CONTRAINDICATIONS:

Hypersensitivity to cephalosporins, infants <1 mo

Precautions: Pregnancy (B), breast-feeding, children, hypersensitivity to penicillins, GI/renal disease

DOSAGE AND ROUTES

cefdinir

Uncomplicated skin and skin-structure infections/community-acquired pneumonia

- **Adult and child ≥13 yr: PO** 300 mg q12hr × 10 days
- **Child 6 mo-12 yr: PO** 7 mg/kg q12hr or 14 mg/kg q24hr × 10 days

Acute exacerbations of chronic bronchitis/acute maxillary sinusitis

- **Adult and child ≥13 yr: PO** 300 mg q12hr or 600 mg q24hr × 10 days or 300 mg bid × 5 days for some infections

Pharyngitis/tonsillitis

- **Adult and child ≥13 yr: PO** 300 mg q12hr or 600 mg q24hr × 10 days
- **Child 6 mo-12 yr: PO** 7 mg/kg q12hr × 5-10 days or 14 mg/kg q24hr × 10 days

Renal dose

- CCr <30 ml/min, 300 mg/day (adult); 7 mg/kg/day (child)

Available forms: Caps 300 mg; susp 125 mg, 250 mg/5 ml

cefditoren pivoxil

- **Adult: PO** 200-400 mg bid × 10 days

Renal dose

- **Adult: PO** CCr 30-50 ml/min, max 200 mg bid; CCr <30 ml/min, max 200 mg daily

Available forms: Tabs 200 mg

cefepime

Febrile neutropenia

- **Adult/adolescent >16 yrs/child ≥ 40 kg: IV** 2 g q8hr × 7 days or until neutropenia resolves
- **Infant ≥2 mo/child/adolescent ≤16 yr and ≤40 kg: IV** 50 mg/kg/dose q8hr × 7-10 days or until neutropenia resolves

Urinary tract infections (mild to moderate)

- **Adult: IV/IM** 0.5-1 g q12hr × 7-10 days

Urinary tract infections (severe)

- **Adult/adolescent >16 yr/child ≥40 kg: IV** 2 g q12hr × 10 days

Pneumonia (moderate to severe)

- **Adult: IV** 1-2 g q12hr × 10 days
- Dosage reduction indicated with renal impairment (CCr <50 ml/min)

Uncomplicated gonorrhea

- **IM** 2 g as a single dose with 1 g **PO** probenecid at the same time

Available forms: Powder for inj 500 mg, 1, 2 g; 1 g/50 ml, 2 g/100 ml

cefixime

- **Adult: PO** 400 mg/day as a single dose or 200 mg q12hr
- **Child >50 kg or >12 yr: PO** use adult dosage
- **Child <50 kg or <12 yr: PO** 8 mg/kg/day as a single dose or 4 mg/kg q12hr

Renal dose

- CCr 21-60 ml/min, give 75% of dose; CCr <20 ml/min, give 50% of dose

Available forms: Tabs 400 mg; powder for oral susp 100 mg/5 ml, chew tabs 100, 200 mg, 200 mg/5 ml

cefotaxime

- **Adult: IM/IV** 1-2 g q12hr
- **Child 1 mo-12 yr: IM/IV** 50-180 mg/kg/day divided q6hr

Severe infections

- **Adult: IM/IV** 2 g q4hr not to exceed 12 g/day
- **Child 1 mo-12 yr: IM/IV** 50-180 mg/kg/day in 4-6 divided doses

Uncomplicated gonorrhea

- **Adult: IM** 1 g
- Dosage reduction indicated for severe renal impairment (CCr <30 ml/min)

Available forms: Powder for inj 500 mg, 1, 2, 10 g; inj 1, 2 g premixed frozen

cefpodoxime

Pneumonia

- **Adult >13 yr: PO** 200 mg q12hr × 14 days

Uncomplicated gonorrhea

- **Adult >13 yr: PO** 200 mg as a single dose

Skin and skin structure

- **Adult >13 yr: PO** 400 mg q12hr × 7-14 days

Pharyngitis and tonsillitis

- **Adult >13 yr: PO** 100 mg q12hr × 10 days
- **Child 5 mo-12 yr: PO** 5 mg/kg q12hr (max 100 mg/dose or 200 mg/day) × 5-10 days

Uncomplicated UTI

- **Adult >13 yr: PO** 100 mg q12hr × 7 days; dosing interval increased with severe renal impairment

Acute otitis media

- **Child 5 mo-12 yr: PO** 5 mg/kg q12hr × 10 days

Available forms: Tabs 100, 200 mg; granules for susp 50 mg, 100 mg/5 ml

cefTAZidime

- **Adult: IV/IM** 1-2 g q8-12hr × 5-10 days
- **Child: IV** 30-50 mg/kg q8hr, max 6 g/day
- **Neonate: IV** 30-50 mg/kg q12hr

Renal dose

- **Adult: IM/IV** CCr <50 ml/min, give q12hr; CCr 10-30 ml/min, give q24hr; CCr <10 ml/min, give q48-72hr

Available forms: Inj 250, 500 mg, 1, 2, 6 g

ceftibuten

- **Adult: PO** 400 mg/day × 10 days
- **Child 6 mo-12 yr: PO** 9 mg/kg/day × 10 days

Renal dose

• **Adult: PO** CCr 30-49 ml/min, give 200 mg q24hr; CCr 5-29 ml/min, give 100 mg q24hr

Available forms: Caps 400 mg; susp 90 mg, 180 mg/5 ml

ceftizoxime

• **Adult: IM/IV** 1-2 g q8-12hr, may give up to 4 g q8hr in life-threatening infections

• **Child >6 mo: IM/IV** 50 mg/kg q6-8hr

Renal dose

• **Adult: IM/IV** CCr <50-80 ml/min, give 500-1500 mg q8hr; CCr 5-49 ml/min, give 250-1000 mg q12hr

PID

• **Adult: IV** 2 g q8hr, may increase to 4 g q8hr in severe infections

Available forms: Powder for inj 500 mg, 1, 2, 10 g; premixed 1 g, 2 g/50 ml

cefTRIAXone

• **Adult: IM/IV** 1-2 g/day, max 2 g q12-24hr

• **Child: IM/IV** 50-75 mg/kg/day in equal doses q12hr

Uncomplicated gonorrhea

• **Adult:** 250 mg **IM** as single dose

• Reduce dosage in severe renal impairment (CCr <10 ml/min)

Meningitis

• **Adult and child: IM/IV** 100 mg/kg/day in equal doses q12hr, max 4 g/day

Surgical prophylaxis

• **Adult: IV** 1 g ½-2 hr before surgery

Available forms: Inj 250, 500 mg, 1, 2, 10 g

Administer:

• Change IV site q72hr

cefdinir

• Oral susp after adding 39 ml water to the 60-ml bottle or 65 ml water to the 120-ml bottle; discard unused portion after 10 days; give without regard to food, do not give within 2 hr of antacids, iron supplements

• After C&S completed

cefditoren pivoxil

• For 10 days to ensure organism death, prevent superinfection

• With food for GI symptoms, do not give with antacids

• After C&S completed

cefepime

Intermittent IV INF route

• IV after diluting in 50-100 ml or more D_5, NS; give over 30 min

• For 7-10 days to ensure organism death, prevent superinfection

Solution compatibilities: 0.9% NaCl, D_5, D_5W, 0.5%, 10% lidocaine, bacteriostatic water for inj with parabens/benzyl alcohol

Y-site compatibilities: DOXOrubicin liposome

cefixime

• For 10-14 days to ensure organism death, prevent superinfection

• Do not break, crush, or chew tab

• Without regard to food

cefotaxime

IV route

• IV after **diluting** 1 g/10 ml D_5W, NS, sterile water for inj, **give** over 3-5 min by Y-tube or 3-way stopcock; may be **diluted further** with 50-100 ml NS or D_5W; **run** over ½-1 hr; discontinue primary inf during administration; may be **diluted** in larger vol of sol, given as a cont inf over 6-24 hr

• For 10-14 days to ensure organism death, prevent superinfection

• Thaw frozen container at room temp or refrigeration; do not force thaw by immersion or microwave; visually inspect container for leaks

Syringe compatibilities: Caffeine, diphenhyDRINATE, heparin, ofloxacin

Y-site compatibilities: Acyclovir, alfentanil, alprostadil, amifostine, amikacin, aminocaproic acid, aminophylline, anidulafungin, ascorbic acid injection, atenolol, atracurium, atropine, aztreonam, benztropine, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, caffeine, calcium chloride/gluconate, CARBOplatin, cefamandole, cefmetazole, cefonicid, cefoperazone, cefoTEtan, cefOXitin, ceftAZidime (L-arginine), ceftRIAXone sodium, cefuroxime, cimeti-

dine, CISplatin, clindamycin, codeine, cyanocobalamin, cyclophosphamide, cyclOSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, dexmedetomidine, digoxin, diltiazem, DOCEtaxel, DOPamine, doxacurium, doxycycline, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, epoetin alfa, eptifibatide, erythromycin, esmolol, etoposide, famotidine, fenoldopam, fentaNYL, fludarabine, fluorouracil, folic acid, furosemide, gatifloxacin, gentamicin, glycopyrrolate, granisetron, heparin, hydrocortisone, HYDROmorphone, ifosfamide, imipenem-cilastatin, insulin (regular), isoproterenol, ketorolac, lidocaine, linezolid, LORazepam, LR, magnesium sulfate, mannitol, mechlorethamine, melphalan, meperidine, metaraminol, methicillin, methotrexate, methoxamine, methyldopate, metoclopramide, metoprolol, metroNIDAZOLE, mezlocillin, miconazole, midazolam, milrinone, minocycline, mitoXANtrone, morphine, moxalactam, multiple vitamins, mycophenolate, nafcillin, nalbuphine, naloxone, nesiritide, netilmicin, nitroglycerin, nitroprusside, norepinephrine, normal saline, octreotide, ofloxacin, ondansetron, ornidazole, oxacillin, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pamidronate, pancuronium, pantoprazole, papaverine, pefloxacin, pemetrexed, penicillin G potassium/sodium, pentamidine, pentazocine, PENTobarbital, peritoneal dialysis solution, perphenazine, PHENobarbital, phenylephrine, phenytoin, phytonadione, piperacillin, polymyxin B, potassium chloride, procainamide, prochlorperazine, promethazine, propofol, propranolol, protamine, pyridoxine, quiNIDine, quinupristin, ranitidine, remifentanil, Ringer's injection, ritodrine, riTUXimab, rocuronium, sargramostim, sodium acetate/bicarbonate, sodium fusidate, sodium lactate, succinylcholine, SUFentanil, sulfamethoxazole-trimethoprim, tacrolimus, teniposide, theophylline, thiamine, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, TNA, tobramycin, tolazoline, TPN, trastuzumab, trimetaphan, urokinase, vancomycin, vasopressin, vecuronium, verapamil, vinorelbine, voriconazole

cefpodoxime

- Do not break, crush, or chew tabs due to taste
- For 10-14 days to ensure organism death, prevent superinfection
- With food for better absorption; do not give within 2 hr of antacids, H_2-receptor antagonists

cefTAZidime

IM route

- **Fortaz, Tazidime vials:** Reconstitute 500 mg or 1 g with 1.5 or 3 ml, respectively, of sterile or bacteriostatic water for inj or 0.5-1% lidocaine (approx 280 mg/ml)
- **Tazicef vials:** Reconstitute 1 g/3 ml sterile water for inj (approx 280 mg/ml)
- **Ceptaz vials:** Reconstitute 1 g/3 ml sterile or bacteriostatic water for inj or 0.5-1% lidocaine (approx 250 mg/ml)
- **Withdraw** dose while making sure needle remains in vial; **ensure** no CO_2 bubbles present; **inject** deeply in large muscle mass, **aspirate** before injection

IV route

- Visually inspect for particulate matter, discoloration, if possible
- **Fortaz, Tazicef, Tazidime packs: Reconstitute** 1 or 2 g/100 ml sterile water for inj or other compatible IV sol (10 or 20 mg/ml, respectively); reconstitution is done in two stages: first, **inject** 10 ml of the diluent into the pack and **shake** well to dissolve and become clear; CO_2 pressure inside container will occur, **insert** vent needle to release pressure; **add** remaining diluents, **remove** vent needle
- **Fortaz, Tazicef, Tazidime vials: Reconstitute** 500 mg, 1 g, 2 g with 5, 10, 10 ml, respectively, of sterile water for inj or other compatible IV solution (100, 95-100, or 170-180 mg/ml, respectively); **shake** well to dissolve
- **Fortaz, Tazidime ADD-Vantage vials (for IV only): Reconstitute** 1 or 2 g with NS, ½ NS, D_5W in either 50- or 100-ml flexible diluent container; to release

CO_2 pressure, **insert** vent needle after dissolving, **remove** vent before using

- **Ceptaz packs: Reconstitute** 1 or 2 g/100 ml sterile water for inj or compatible IV sol (10 or 20 mg/ml, respectively); reconstitution is done in two stages: first, **inject** 10 ml of the diluent into the pack and **shake** well to dissolve, **add** the remaining diluent, **insert** vent needle before giving
- **Ceptaz vials: Reconstitute** 1 or 2 g/10 ml of sterile water for inj or compatible IV sol (90-95, or 170-180 mg/ml, respectively)
- **Ceptaz ADD-Vantage vials (for IV only): Reconstitute** 1 or 2 g with NS, ½ NS, or D_5W in either 50- or 100-ml diluent container

Direct Intermittent IV INF route

- **Vials: withdraw** dose while making sure needle remains in sol; make sure there are no CO_2 bubbles in syringe before inj; **inject** directly over 3-5 min or slowly into tubing of a free-flowing compatible IV solution

Intermittent IV INF route

- **Vials: withdraw** dose while making sure needle opening remains in sol; make sure there are no CO_2 bubbles in syringe before inj; infusion packs and ADD-Vantage systems ready for inf after reconstitution, **infuse** over 15-30 min

Syringe compatibilities: Cimetidine, dimenhyDRINATE, HYDROmorphone

Y-site compatibilities: Acyclovir, alfentanil, allopurinol, amifostine, amikacin, aminocaproic acid, aminophylline, amphotericin B lipid complex, anakinra, anidulafungin, atenolol, atropine sulfate, aztreonam, benzotropine, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium gluconate, CARBOplatin, cefamandole, ceFAZolin, cefonicid, cefoperazone, cefoTEtan, cefOXitin, ceftAZidime, ceftizoxime, ceftRIAXone, cefuroxime, cephalothin, cephapirin, cimetidine, ciprofloxacin, CISplatin, clindamycin, codeine, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, dexmedetomidine, digoxin, diltiazem, DOCEtaxel, DOPamine, doxacurium, doxapram, enalaprilat, ePHEDrine, EPINEPHrine, epoetin alfa, eptifibatide, esmolol, etoposide, famotidine, fenoldopam, fentaNYL, filgrastim, fludarabine, fluorouracil, folic acid, foscarnet, furosemide, gallium, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, heparin, HYDROmorphone, ifosfamide, imipenem-cilastatin, indomethacin, insulin (regular), irinotecan, isepamicin, isoproterenol, isosorbide, ketamine, ketorolac, labetalol, levofloxacin, lidocaine, linezolid, LORazepam, LR, magnesium sulfate, mannitol, mechlorethamine, melphalan, meperidine, metaraminol, methicillin, methotrexate, methoxamine, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, miconazole, milrinone, morphine, moxalactam, multiple vitamin inj, nafcillin, nalbuphine, PACLitaxel, ranitidine, remifentanil, tacrolimus, teniposide, theophylline, thiotepa, vinorelbine, zidovudine

ceftibuten

- For 10 days to ensure organism death, prevent superinfection
- Without regard to food

ceftizoxime

IV route

- IV after **diluting** 1 g/10 ml sterile water, shake and **give** over 3-5 min; may be **diluted further** with 50-100 ml NS or D_5W; give through Y-tube or 3-way stopcock; **run** over ½-1 hr
- For 10-14 days to ensure organism death, prevent superinfection

Y-site compatibilities: Acyclovir, alfentanil, allopurinol, amifostine, amikacin, aminocaproic acid, aminophylline, amiodarone, amphotericin B cholesteryl, amphotericin B liposome, anidulafungin, ascorbic acid injection, atenolol, atracurium, atropine, aztreonam, benztropine, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, caspofungin, cefamandole, ceFAZolin, cefmet-

azole, cefoperazone, cefoTEtan, cefTAZidime, cefTRIAXone, cefuroxime, cephalothin, cephapirin, cimetidine, CISplatin, clindamycin, codeine, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, dexmedetomidine, digoxin, diltiazem, diphenhydrAMINE, DOCEtaxel, DOPamine, doxacurium, DOXOrubicin, DOXOrubicin liposomal, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, epoetin alfa, eptifibatide, esmolol, etoposide, fenoldopam, fentaNYL, fluconazole, fludarabine, fluorouracil, folic acid, foscarnet, furosemide, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, heparin, hydrocortisone, HYDROmorphone, IDArubicin, ifosfamide, imipenem-cilastatin, insulin (regular), irinotecan, isoproterenol, ketorolac, labetalol, levofloxacin, lidocaine, linezolid, LORazepam, LR, magnesium sulfate, mannitol, mechlorethamine, melphalan, meperidine, methotrexate, methoxamine, methyldopate, metoclopramide, metoprolol, metroNIDAZOLE, mezlocillin, midazolam, milrinone, mitoXANtrone, morphine, multiple vitamins injection, mycophenolate mofetil, nafcillin, naloxone, nesiritide, netilmicin, niCARdipine, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pamidronate, pancuronium, pantoprazole, PEMEtrexed, penicillin G potassium/sodium, PHENobarbital, phenylephrine, phytonadione, piperacillin, polymyxin B, potassium chloride, propofol, propranolol, ranitidine, remifentanil, Ringer's, ritodrine, riTUXimab, rocuronium, sargramostim, sodium acetate/bicarbonate, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiotepa, ticarcillin-clavulanate, tigecycline, tirofiban, TNA, tobramycin, TPN, trastuzumab, trimetaphan, vasopressin, verapamil, vinCRIStine, vinorelbine, voriconazole

cefTRIAXone

* For 10-14 days to ensure organism death, prevent superinfection

• **IM** inj deeply in large muscle mass

IV route

• **IV** after **diluting** 250 mg/2.4 ml D_5W, water for inj, 0.9% NaCl; may be **further diluted** with 50-100 ml NS, D_5W, $D_{10}W$; shake; **run** over $^1/_2$-1 hr

• Do not mix with calcium salts

Y-site compatibilities: Acyclovir, alfentanil, allopurinol, amifostine, amikacin, aminocaproic acid, aminophylline, amiodarone, amphotericin B liposome, anidulafungin, atenolol, atracurium, atropine, aztreonam, benztropine, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, CARBOplatin, cefamandole, ceFAZolin, cefmetazole, cefonicid, cefoperazone, cefoTAXime, cefoTEtan, cefOXitin, cefTAZidime, ceftizoxime, cefuroxime, cephalothin, cephapirin, cimetidine, cisatracurium, CISplatin, codeine, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, dexmedetomidine, digoxin, diltiazem, DOCEtaxel, DOPamine, doxacurium, DOXOrubicin liposomal, doxycycline, drotrecogin alfa, enalaprilat, ePHEDrine, EPINEPHrine, epoetin alfa, eptifibatide, erythromycin, esmolol, etoposide, fenoldopam, fludarabine, fluorouracil, folic acid, foscarnet, furosemide, gallium, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, heparin, hydrocortisone, HYDROmorphone, ifosfamide, indomethacin, insulin (regular), isoproterenol, ketorolac, lansoprazole, levofloxacin, lidocaine, linezolid, LORazepam, mannitol, mechlorethamine, melphalan, meperidine, metaraminol, methicillin, methotrexate, methoxamine, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, mezlocillin, miconazole, midazolam, milrinone, morphine, moxalactam, multiple vitamins injection, nafcillin, nalbuphine, naloxone, nesiritide, netilimicin, nitroglycerin, nitroprusside, norepinephrine, octreotide, oxacillin, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pamidro-

nate, pancuronium, pantoprazole, PEMEtrexed, penicillin G potassium/sodium, PHENobarbital, phenylephrine, phytonadione, piperacillin, polymyxin B, potassium chloride, procainamide, propofol, propranolol, pyridoxine, ranitidine, remifentanil, ritodrine, riTUXimab, rocuronium, sargramostim, sodium acetate/bicarbonate, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiamine, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, tolazoline, trastuzumab, trimetaphan, urokinase, vasopressin, vecuronium, verapamil, vinCRIStine, voriconazole, warfarin, zidovudine

SIDE EFFECTS

CNS: Headache, dizziness, weakness, paresthesia, fever, chills, seizures, dyskinesia (cefdinir); neurotoxicity (renal disease) cefepime

CV: Heart failure, syncope (cefdinir)

EENT: *Oral candidiasis*

GI: *Nausea, vomiting, diarrhea, anorexia,* pain, glossitis, bleeding; increased AST, ALT, bilirubin, LDH, alk phos; abdominal pain, pseudomembranous colitis; cholestasis (cefotaxime)

GU: Proteinuria, vaginitis, pruritus, *candidiasis,* increased BUN, nephrotoxicity, renal failure

HEMA: Leukopenia, thrombocytopenia, agranulocytosis, anemia, neutropenia, lymphocytosis, eosinophilia, pancytopenia, hemolytic anemia

INTEG: Rash, urticaria, dermatitis

MS: Arthralgia (cefditoren)

RESP: Dyspnea

SYST: Anaphylaxis, serum sickness, Stevens-Johnson syndrome, toxic epidermal necrolysis

PHARMACOKINETICS

cefdinir

Unchanged in urine; crosses placenta, blood-brain barrier; eliminated in breast milk, not metabolized; 60%-70% protein binding, half-life 1.7 hr

cefditoren pivoxil

Well absorbed when broken down (prodrug), wide distribution, half-life 100 min, onset rapid, peak 0.5-3 hr, duration 12 hr, 88% protein binding

cefepime

Peak 79 min; half-life 2 hr; 20% bound by plasma proteins; 90% excreted unchanged in urine; crosses placenta, blood-brain barrier; excreted in breast milk, not metabolized

cefixime

PO: Peak 1-2 hr, half-life 3-4 hr, 65% bound by plasma proteins, 50% eliminated unchanged in urine, crosses placenta, excreted in breast milk

cefotaxime

Half-life 1 hr, 35%-65% is bound by plasma proteins, 40%-65% is eliminated unchanged in urine in 24 hr, 25% metabolized in the liver to active metabolites, excreted in breast milk (small amounts)

IM: Onset 30 min

IV: Onset 5 min

cefpodoxime

Half-life 3 hr, 21%-29% bound by plasma proteins, 30% eliminated unchanged in urine in 8 hr, crosses placenta, excreted in breast milk

cefTAZidime

IM/IV:

Peak 1 hr, half-life 1-1½ hr, 90% bound by plasma proteins, 80% eliminated unchanged in urine, crosses placenta, excreted in breast milk

ceftibuten

PO: Peak 2-3 hr; plasma protein binding 65%, elimination half-life 2 hr, extensively metabolized to an active metabolite

ceftizoxime

Half-life 1.6 hr, 30% bound by plasma proteins, 36%-60% eliminated unchanged in urine, crosses placenta, excreted in breast milk

IM: Peak 1 hr

IV: Onset 5 min

cefTRIAXone

Half-life 6-9 hr, 90% protein binding 58%-96%, eliminated unchanged in

urine, crosses placenta, excreted in breast milk
IM: Peak 2-3 hr
IV: Onset 5 min

INTERACTIONS

Increase: bleeding—anticoagulants, thrombolytics, plicamycin, valproic acid, NSAIDs
Increase: toxicity—aminoglycosides, furosemide, probenecid
Decrease: absorption of cefdinir—iron
Drug/Food
Decrease: absorption—iron-rich cereal, infant formula
Drug/Lab Test
Increase: ALT, AST, alk phos, LDH, bilirubin, BUN, creatinine
False increase: creatinine (serum urine), urinary 17-KS
False positive: urinary protein, direct Coombs' test, urine glucose
Interference: cross-matching

NURSING CONSIDERATIONS

Assess:
• Sensitivity to penicillin, other cephalosporins
⚠ **Nephrotoxicity:** increased BUN, creatinine; urine output: if decreasing, notify prescriber
• Blood studies: AST, ALT, CBC, Hct, bilirubin, LDH, alk phos, Coombs' test monthly if patient is on long-term therapy
• Electrolytes: potassium, sodium, chloride monthly if patient is on long-term therapy
• **Pseudomembranous colitis:** bowel pattern daily; if severe diarrhea occurs, product should be discontinued
• IV site for extravasation, phlebitis
⚠ **Anaphylaxis:** rash, urticaria, pruritus, chills, fever, joint pain, angioedema; may occur a few days after therapy begins
• Bleeding: ecchymosis, bleeding gums, hematuria, stool guaiac
⚠ **Overgrowth of infection:** perineal itching, fever, malaise, redness, pain, swelling, drainage, rash, diarrhea, change in cough, sputum

Evaluate:
• Therapeutic response: decreased symptoms of infection; negative C&S
Teach patient/family:
• If diabetic, to check blood glucose
⚠ To report sore throat, bruising, bleeding, joint pain, may indicate **blood dyscrasias (rare);** diarrhea with mucus, blood, may indicate **pseudomembranous colitis**
• That cefditoren can be taken with oral contraceptives

TREATMENT OF ANAPHYLAXIS: EPINEPHrine, antihistamines; resuscitate if needed

C

cephradine

See cephalosporins—1st generation

certolizumab pegol (Rx)

(ser'tue-liz'oo-mab pegh'ol)
Cimzia
Func. class.: Biologic response modifier
Chem. class: Anti-tissue necrosis factor (anti-TNF) agent

ACTION: Monoclonal antibody that neutralizes the activity of tumor necrosis factor α (TNF-α) found in Crohn's disease; decreases infiltration of inflammatory cells

USES: Crohn's disease (moderate to severe) that has not responded to conventional therapy, rheumatoid arthritis (moderate to severe)
Unlabeled uses: Moderate to severe chronic plaque psoriasis, fistulizing Crohn's disease

CONTRAINDICATIONS: Influenza, IV administration, sepsis, hypersensitivity

Black Box Warning: Infection, neoplastic disease

Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, AIDS, coagulopathy, diabetes, fungal infection, heart failure, hepatitis, human antichimeric antibody, immunosuppression, leukopenia, MS, cancer, neurologic/renal disease, surgery, thrombocytopenia, TB, vaccinations

DOSAGE AND ROUTES

Crohn's disease (moderate to severe)

- **Adult: SUBCUT** 400 mg given as 2 inj at wk 0, 2, 4; if clinical response occurs, give 400 mg q4wk

Rheumatoid arthritis (moderate to severe)

- **Adult: SUBCUT** 400 mg q2wk × 3 doses then 200 mg q2wk; given with methotrexate

Crohn's disease (fistulizing)/ intolerant to infliximab (unlabeled)

- **Adult: SUBCUT** 400 mg wk 0, 2, 4 then 400 mg q4wk

Available forms: Powder for inj 400-mg kit

Administer:

SUBCUT route

- Give by subcut inj only
- Reconstitution: allow to warm to room temp; add 1 ml sterile water for inj to each vial; 2 vials will be needed for patients with Crohn's disease
- Gently swirl; do not shake; full reconstitution may take up to 30 min; reconstituted product may remain at room temp for up to 2 hr or refrigerated up to 24 hr
- If reconstituted product has been refrigerated, allow to warm to room temp
- Use 2 syringes and two 20G needles
- Withdraw reconstituted sol from each vial into separate syringes; each will contain 200 mg; switch 20G to 23G needle; inject into 2 separate sites in abdomen or thigh
- Store in refrigerator; do not freeze

SIDE EFFECTS

CNS: *Dizziness,* syncope, peripheral neuropathy, fever, seizures, demyelinating disease of CNS

CV: Hypotension, heart failure, MI, cardiac dysrhythmia

EENT: Optic neuritis, retinal hemorrhage, uveitis

GI: Increased LFTs, hepatitis, bowel obstruction

GU: UTI, renal disease

HEMA: Anemia, aplastic anemia, pancytopenia, thrombocytopenia

INTEG: *Rash, urticaria,* angioedema

MISC: Anaphylaxis, antibody formation, arthralgia, bleeding, infection, lupuslike symptoms, lymphadenopathy, malignancies, serum sickness, suicidal ideation

RESP: Dyspnea, upper respiratory tract infection

PHARMACOKINETICS

Peak 54-171 hr, terminal half-life 14 days

INTERACTIONS

- Do not administer live vaccines, toxoids concurrently

Increase: possible infections—abatacept, adalimumab, anakinra, etanercept, immunosuppressive agents, infliximab, rilonacept; do not use concurrently

Increase: possible malignancies—adalimumab, etanercept, infliximab

NURSING CONSIDERATIONS

Assess:

- Antinuclear antibody test (ANA), hepatitis B serology, CBC
- For rheumatoid arthritis, ROM, pain
- GI symptoms: nausea, vomiting, abdominal pain, hepatitis, increased LFTs
- Periodic blood counts (CBC)
- CV status: B/P, pulse, chest pain

Allergic reaction, anaphylaxis: rash, dermatitis, urticaria, dyspnea, hypotension, fever, chills; discontinue if severe; administer EPINEPHrine, corticosteroids, antihistamines; assess for allergies to murine proteins before starting therapy

Black Box Warning: Infection: discontinue if infection occurs; do not administer to patients with active infection

Black Box Warning: Identify TB, risk for HBV before beginning treatment; TB test should be obtained; if present, TB should be treated prior to certolizumab treatment

Evaluate:
• Therapeutic response: absence of fever, mucus in stools

Teach patient/family:
• Not to breastfeed while taking this product

Black Box Warning: To notify prescriber of GI symptoms, hypersensitivity reactions, infections, fluid retention; redness, pain, swelling at inj site

Black Box Warning: Not to operate machinery, drive if dizziness, vertigo occur

cetirizine (Rx, OTC)

(se-teer'i-zeen)

All Day Allergy, All Day Allergy Children's, GNP All Day Allergy, GNP Children's All Day Allergy, Good Sense All Day Allergy, Good Sense Children's All Day Allergy, Publix Allergy Children's, Reactine ✤, Top Care Children's All Day Allergy, Zyrtec, Zyrtec Children's

Func. class.: Antihistamine (2nd generation, peripherally selective)

Chem. class.: Piperazine, H_1-histamine antagonist

Do not confuse:
ZyrTEC/Xanax/Zantac

ACTION: Acts on blood vessels, GI, respiratory system by competing with histamine for H_1-receptor site; decreases allergic response by blocking pharmacologic effects of histamine; minimal anticholinergic, sedative action

USES: Rhinitis, allergy symptoms, chronic idiopathic urticaria
Unlabeled uses: Asthma, atopic dermatitis

CONTRAINDICATIONS: Breastfeeding, newborn or premature infants, hypersensitivity to this product or hydrOXYzine, severe hepatic disease
Precautions: Pregnancy (B), children, geriatric patients, respiratory disease, angle-closure glaucoma, prostatic hypertrophy, bladder neck obstruction, asthma

C

DOSAGE AND ROUTES

Perennial/seasonal allergic rhinitis or idiopathic urticaria
• **Adult and child ≥6 yr: PO** 5-10 mg/day
• **Child 2-5 yr: PO** 2.5 mg/day, may increase to 5 mg/day or 2.5 mg bid
• **Child 1-2 yr: PO** 2.5 mg/day, may increase to 2.5 mg q12hr
• **Geriatric: PO** 5 mg/day, may increase to 10 mg/day

Self-treatment of hay fever/other respiratory allergies
• **Adult/adolescent/child ≥6 yr: PO** 10 mg/day; **ORAL SOL** 5-10 mg/day

Renal dose/hemodialysis/hepatic dose
• **Adult: PO** CCr 11-31 ml/min, 5 mg/day

Atopic dermatitis (unlabeled)
• **Child 6-12 yr: PO** 5-10 mg/day
• **Child 1-2 yr: PO** 0.25 mg/kg bid

Available forms: Tabs 5, 10 mg; syr 5 mg/5 ml, prefilled spoons 1 mg/ml; oral sol 5 mg/ml; liquid-filled caps 10 mg; chew tabs 5, 10 mg

Administer:
• Without regard to meals
• **Caps:** swallow whole, do not break, cut, chew, crush
• **Chew tabs:** chew before swallowing, may use with or without water
• **Oral liquid:** use calibrated measuring device

SIDE EFFECTS

CNS: *Headache,* stimulation, *drowsiness,* sedation, *fatigue,* confusion,

blurred vision, tinnitus, restlessness, tremors; paradoxical excitation in children, geriatric patients
GI: *Dry mouth,* increased LFTs, constipation
INTEG: Rash, eczema, photosensitivity, urticaria
RESP: *Thickening of bronchial secretions,* dry nose, throat

PHARMACOKINETICS

Absorption rapid; onset ½ hr; peak 1-2 hr; duration 24 hr; protein binding 93%; half-life decreased in children, increased in renal/hepatic disease

INTERACTIONS

Increase: CNS depression—alcohol, opiates, sedative/hypnotics, other CNS depressants
Increase: anticholinergic/sedative effect—MAOIs
Increase: cetirizine effect—ritonavir
Drug/Food
• Food prolongs absorption by 1.7 hr
Drug/Lab Test
False negative: skin allergy tests

NURSING CONSIDERATIONS

Assess:
• **Allergy symptoms:** pruritus, urticaria, watering eyes at baseline and during treatment
• Respiratory status: rate, rhythm, increase in bronchial secretions, wheezing, chest tightness
• Blood studies: LFTs, BUN, creatinine at baseline, periodically
Perform/provide:
• Hard candy, gum, frequent rinsing of mouth for dryness
• Storage in tight, light-resistant container
Evaluate:
• Therapeutic response: absence of running or congested nose, rashes
Teach patient/family:
• About all aspects of product use; to notify prescriber if confusion, sedation, hypotension occur
• To avoid driving, other hazardous activity if drowsiness occurs
• To avoid alcohol, other CNS depressants, OTC antihistamines
• To avoid exposure to sunlight; burns may occur
• To use sugarless gum, candy, frequent sips of water to minimize dry mouth
• Not to breastfeed

TREATMENT OF OVERDOSE:

Administer diazepam, vasopressors, phenytoin IV

cetrorelix (Rx)

(set-roe-ree'lix)
Cetrotide
Func. class.: Gonadotropin-releasing hormone antagonist
Chem. class.: Synthetic decapeptide

ACTION: Inhibitor of pituitary gonadotropin secretion; initially increases LH and FSH, induces a rapid suppression of gonadotropin secretion

USES: For inhibition of premature LH surges in women undergoing controlled ovarian hyperstimulation
Unlabeled uses: Benign prostatic hyperplasia (BPH), endometriosis

CONTRAINDICATIONS: Pregnancy (X), breastfeeding, hypersensitivity, latex allergy, renal disease
Precautions: Geriatric patients

DOSAGE AND ROUTES

Single-dose regimen
• **Adult: SUBCUT** 3 mg when serum estradiol level at appropriate stimulation response, usually on stimulation day 7; if hCG not given within 4 days after inj of 3 mg cetrorelix, give 0.25 mg daily until day of hCG administration
Multiple-dose regimen
• **Adult: SUBCUT** 0.25 mg given on stimulation day 5 (either morning or

evening) or 6 (morning) and continued daily until day hCG is given

BPH (unlabeled)

• **Adult (male): SUBCUT** 5 mg bid × 2 days then 1 mg/day

Endometriosis (unlabeled)

• **Adult (female): SUBCUT** 3 mg weekly

Available forms: Inj 0.25, 3 mg

Administer:

SUBCUT route

• Attach yellow-marked needle to diluent syringe, dilute powder by injecting liquid from syringe into vial, leaving syringe on vial; gently swirl until clear, avoid bubbles; withdraw contents of vial back into syringe, replace yellow-marked needle with gray-marked needle

• SUBCUT using abdomen, 1 inch away from navel or upper thigh; swab inj area with disinfectant; clean a 2-inch circle and allow to dry; pinch up area between thumb and finger; insert needle 45-90 degrees to surface; if positioned correctly, no blood will be drawn back into syringe; reposition needle without removing it; rotate inj sites

• Protect from light

SIDE EFFECTS

CNS: Headache

CV: Edema

ENDO: Ovarian hyperstimulation syndrome, abdominal pain (gyn)

GI: Nausea, vomiting, diarrhea

INTEG: Pain on inj; local site reactions, bruising, pruritus

Other: Rapid weight gain

RESP: Shortness of breath

SYST: Fetal death, anaphylaxis

PHARMACOKINETICS

Excreted in feces/urine, half-life depends on dosage, metabolized to metabolites, protein binding 86%

NURSING CONSIDERATIONS

Assess:

• Serum progesterone, LH; ovarian ultrasound day 7-14; pelvic exam, serum estradiol/gonadotropin; weight

• For suspected pregnancy; product should not be used, pregnancy (X)

• For latex allergy, product should not be used

⚠ For anaphylaxis during first inf

Evaluate:

• Therapeutic response: pregnancy

Teach patient/family:

• To report abdominal pain, vaginal bleeding, nausea, vomiting, diarrhea, SOB, peripheral edema

• How to perform self-administration technique if needed

C

cetuximab (Rx)

(se-tux'i-mab)

Erbitux

Func. class.: Antineoplastic—miscellaneous, monoclonal antibody

Chem. class.: Epidermal growth factor receptor inhibitor

ACTION: Not fully understood; binds to epidermal growth factor receptors (EGFRs); inhibits phosphorylation and activation of receptor-associated kinase, thereby resulting in inhibition of cell growth

USES: Alone or in combination with irinotecan for EGFRs expressing metastatic colorectal carcinoma, head/neck cancer

Unlabeled uses: Front-line use for non–small-cell lung cancer in combination with CISplatin and vinorelbine

CONTRAINDICATIONS: Hypersensitivity to this product, murine proteins

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients; CV/renal/hepatic disease; ocular, pulmonary disorders

Black Box Warning: Arrhythmias, CAD, infusion-related reactions, radiation, cardiac, respiratory arrest

DOSAGE AND ROUTES

• **Adult: IV INF** 400 mg/m² loading dose given over 120 min, max inf rate 5 ml/min; weekly maintenance dose (all other inf) is 250 mg/m² given over 60 min, max inf rate 5 ml/min (10 mg/min); premedicate with an H_1-antagonist (diphenhydrAMINE 50 mg IV); dosage adjustments made for inf reactions or dermatologic toxicity; other protocols used

Non–small-cell lung cancer (NSCLC) (unlabeled)

• **Adult: IV** 400 mg/m² over 120 min (max 5 ml/min) week 1 with weekly inf of 250 mg/m² over 60 min (max 5 ml/min) with CISplatin 80 mg/m² on day 1 and vinorelbine 25 mg/m² on days 1, 8

Available forms: Sol for inj 100 mg/50 ml, 200 mg/100 ml

Administer:

Intermittent IV INF route

• Use cytoxic handling procedures
• By IV inf only; do not give by IV push or bolus; do not shake or dilute
• Do not dilute with other products
• Storage refrigerated at 36° F-46° F, discard unused portions
• **Inf pump:** draw up volume of vial using appropriate syringe/needle (vented spike or other appropriate transfer device); fill Erbitux into sterile evacuated container/bag, repeat until calculated volume put into the container; use new needle for each vial; give through in-line filter (low protein binding 0.22 micrometer); affix inf line and prime before starting inf, max rate 5 ml/min; flush line at end of inf with 0.9% NaCl, use a low protein binding 0.22-micrometer in-line filter
• **Syringe pump:** draw up volume of vial using appropriate syringe/needle (vented spike); place syringe into syringe driver of syringe pump and set rate; use in-line filter (low protein binding 0.22-micrometer); connect inf line, start inf after priming; repeat until calculated volume given
• Use new needle and filter for each vial, max 5 ml/min rate; use 0.9% NaCl to flush line after inf
• Do not piggyback to patient inf line
• Observe patient for adverse reactions for 1 hr after inf

Black Box Warning: Inf reactions: if mild (grade 1 or 2), reduce all doses by 50%; if severe (grade 3 or 4), permanently discontinue

SIDE EFFECTS

CNS: *Headache, insomnia, depression,* aseptic meningitis
CV: Cardiac arrest
GI: *Nausea, diarrhea, vomiting, anorexia, mouth ulceration, dehydration, constipation, abdominal pain*
HEMA: Leukopenia, anemia
INTEG: Rash, pruritus, acne, dry skin, toxic epidermal necrolysis, angioedema, *blepharitis, cheilitis, cellulitis, cysts, alopecia, skin/nail disorder,* acute infusion reactions, other skin toxicities
MISC: *Conjunctivitis, asthma, malaise, fever,* renal failure, hypomagnesemia
MS: *Back pain*
RESP: Interstitial lung disease, *cough, dyspnea,* pulmonary embolus, *peripheral edema,* respiratory arrest
SYST: Anaphylaxis, sepsis, infection

PHARMACOKINETICS

Half-life 114 hr, steady state by 3rd wkly inf, peak 168-235 g/ml, trough 41-85 g/ml

INTERACTIONS

Drug/Lab:
Increase: LFTs

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Pulmonary changes: lung sounds, cough, dyspnea; interstitial lung disease may occur, may be fatal; discontinue therapy if confirmed

• Cardiac arrest: monitor electrolytes, in those undergoing radiation therapy, electrolytes may be decreased

⚠ Serious hypersensitivity reactions: toxic epidermal necrosis, angioedema, anaphylaxis
• GI symptoms: frequency of stools, dehydration, abdominal pain, stomatitis
• **K-RAS mutations** with metastatic colorectal carcinoma; if K-RAS mutation on codon 12 or 13 detected, patient should not receive anti-EGFR antibody therapy

Evaluate:
• Therapeutic response: decreased growth, spread of EGFR-expressing metastatic colorectal, head/neck carcinoma

Teach patient/family:
Black Box Warning: To report adverse reactions immediately: shortness of breath, severe abdominal pain, skin eruptions
• About the reason for treatment, expected results
Black Box Warning: To use contraception during treatment (pregnancy [C]), not to breastfeed
• To wear sunscreen and hats to limit sun exposure; sun exposure can exacerbate any skin reactions
• To avoid crowds, persons with known infections

chlordiazePOXIDE (Rx)

(klor-dye-az-e-pox'ide)

Librium

Func. class.: Antianxiety
Chem. class.: Benzodiazepine, long-acting

Controlled Substance Schedule IV

Do not confuse:
Librium/Librax

ACTION: Potentiates the actions of GABA, especially in the limbic system, reticular formation

USES: Short-term management of anxiety, acute alcohol withdrawal, preoperatively for relaxation

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, children <6 yr, hypersensitivity to benzodiazepines, closed-angle glaucoma, psychosis
Precautions: Geriatric patients, debilitated, renal/hepatic disease, suicidal ideation, abrupt discontinuation

C

DOSAGE AND ROUTES

Mild anxiety
• **Adult: PO** 5-10 mg tid-qid
• **Geriatric: PO** 5 mg bid initially, increase as needed
• **Child >6 yr: PO** 5 mg bid-qid, max 10 mg bid-tid

Severe anxiety
• **Adult: PO** 25-50 mg tid-qid

Preoperatively
• **Adult: PO** 5-10 mg tid-qid on day before surgery

Alcohol withdrawal
• **Adult: PO** 50-100 mg q4-6hr prn, max 300 mg/day

Renal disease
• **Adult: PO** CCr <10 ml/min, give 50% dose

Available forms: Caps 5, 10, 25 mg
Administer:
PO route
• With food or milk for GI symptoms

SIDE EFFECTS

CNS: *Dizziness, drowsiness,* confusion, headache, anxiety, tremors, stimulation, fatigue, depression, insomnia, hallucinations
CV: *Orthostatic hypotension,* edema, ECG changes, tachycardia, hypotension
EENT: *Blurred vision,* tinnitus, mydriasis
GI: Constipation, dry mouth, nausea, vomiting, anorexia, diarrhea
GU: Irregular periods, decreased libido
HEMA: Agranulocytosis
INTEG: Rash, dermatitis, itching

PHARMACOKINETICS

PO: Onset 30 min, peak within 2 hr, duration 4-6 hr, metabolized by liver, excreted by kidneys, crosses placenta, excreted in breast milk, half-life 5-30 hr (increased in geriatric patients)

INTERACTIONS

Increase: CNS depression—CNS depressants, alcohol
Increase: chlordiazePOXIDE—cimetidine, disulfiram, FLUoxetine, isoniazid, ketoconazole, metoprolol, oral contraceptives, propranolol, valproic acid
Decrease: action of levodopa
Decrease: action of chlordiazePOXIDE—CYP3A4 inhibitors (protease inhibitors, barbiturates, rifamycins)

Drug/Lab Test
Increase: LFTs
False increase: 17-OHCS
False positive: pregnancy test (some methods)

NURSING CONSIDERATIONS

Assess:
- B/P (lying, standing), pulse; if systolic B/P drops 20 mm Hg, hold product, notify prescriber
- Blood studies: CBC during long-term therapy; **blood dyscrasias** have occurred rarely
- Hepatic studies: AST, ALT, bilirubin, creatinine, LDH, alk phos during long-term therapy
- For ataxia, oversedation of geriatric patients, debilitated patients
- Physical dependency, withdrawal symptoms: headache, nausea, vomiting, muscle pain, weakness after long-term use
- Mental status: mood, sensorium, affect, sleeping pattern, drowsiness, dizziness; suicidal tendencies; paradoxic reactions such as excitement, stimulation, acute rage
- For pregnancy; product should not be used during pregnancy (D)

Perform/provide:
- Assistance with ambulation during beginning therapy because drowsiness, dizziness occur
- Check to confirm that PO medication has been swallowed if patient is depressed, suicidal
- Sugarless gum, hard candy, frequent sips of water for dry mouth

Evaluate:
- Therapeutic response: decreased anxiety, restlessness, sleeplessness

Teach patient/family:
- That product may be taken with food
- Not to use product for everyday stress or use for more than 4 mo unless directed by prescriber
- Not to take more than prescribed amount; may be habit forming
- To avoid OTC preparations unless approved by prescriber
- To avoid driving, activities that require alertness because drowsiness may occur
- To avoid alcohol ingestion, other psychotropic medications unless directed by prescriber
- Not to discontinue medication abruptly after long-term use because this may precipitate seizures
- To rise slowly because fainting may occur, especially among geriatric patients
- That drowsiness may be worse at beginning of treatment
- To notify prescriber if pregnancy is suspected or planned
- To immediately report suicidal thoughts/behaviors

TREATMENT OF OVERDOSE:

Lavage, VS, supportive care, give flumazenil

chloroquine (Rx)

(klor'oh-kwin)

Aralen

Func. class.: Antimalarial

Chem. class.: Synthetic 4-amino-quinoline derivative

ACTION: Inhibits parasite replication, transcription of DNA to RNA by forming complexes with DNA of parasite

USES: Malaria of *Plasmodium vivax, P. malariae, P. ovale, P. falciparum* (some strains); amebiasis

Unlabeled uses: Discoid lupus erythematosus, polymorphous light eruption, rheumatoid arthritis, ulcerative colitis

CONTRAINDICATIONS: Hypersensitivity, retinal field changes

Precautions: Pregnancy (C), breast-feeding, children, blood dyscrasias, severe GI disease, neurologic disease, alcoholism, hepatic disease, G6PD deficiency, psoriasis, eczema, seizures, preexisting auditory damage, torsades de pointes

Black Box Warning: Infection

DOSAGE AND ROUTES

Acute malaria attacks

- **Adult: PO** 1000 mg (600-mg base), then 500 mg (300-mg base) in 6-8 hr, then 500 mg (300-mg base) daily × 2 days for a total of 2.5 g (1.5-g base) in 3 days
- **Adult/adolescent of low body weight, child/infant: PO** 16.5 mg (10-mg base)/kg, max 600-mg base; then 8.3 mg (5-mg base)/kg, max 300-mg base 6 hr after 1st dose, then 8.3 mg (5-mg base)/kg, max 300-mg base 24 hr after 1st dose; then 8.3 mg (5-mg base)/kg, max 300-mg base 36 hr after 1st dose

Malaria prophylaxis (in areas with chloroquine–sensitive *P. falciparum*)

- **Adult: PO** 500 mg (300-mg base) weekly on same day of each wk starting 2 wk before travel and for 8 wk after leaving

Extraintestinal amebiasis

- **Adult: PO** 1 g (600-mg base) daily × 2 days, then 500 mg (300-mg base) for ≥2-3 wk
- **Child (unlabeled): PO** 16.6 mg (10-mg base)/kg (max 300-mg base) daily × 2-3 wk

Rheumatoid arthritis/discoid lupus erythematosus (unlabeled)

- **Adult: PO** 250 mg (150-mg base) daily

Available forms: Tabs 250 mg (150-mg base), 500 mg (300-mg base) phosphate

Administer:

- Product in mg or base; they are different

PO route

- Before or after meals at same time each day to maintain product level

SIDE EFFECTS

CNS: Headache, stimulation, fatigue, seizures, psychosis, hallucinations, insomnia

CV: Hypotension, heart block, asystole with syncope, ECG changes, cardiomyopathy

EENT: *Blurred vision, corneal changes, retinal changes, difficulty focusing,* tinnitus, vertigo, deafness, photophobia, corneal edema

GI: *Nausea, vomiting, anorexia,* diarrhea, cramps

HEMA: Thrombocytopenia, agranulocytosis, hemolytic anemia, leukopenia

INTEG: Pruritus, pigmentary changes, skin eruptions, lichen-planus–like eruptions, eczema, exfoliative dermatitis

PHARMACOKINETICS

Metabolized in liver; excreted in urine, feces, breast milk; crosses placenta

PO: Peak 1-3 hr, half-life 3-5 days

INTERACTIONS

- Reduced oral clearance and metabolism of chloroquine: cimetidine

Increase: QT prolongation, torsades de pointes—class IA, III antidysrhythmics

Increase: effects—2D6 inhibitors (amiodarone, chlorpheniramine, FLUoxetine, haloperidol, ritonavir, PARoxetine, terbinafine, ticlopidine); CYP3A4 inhibitors (diltiazem, verapamil, itraconazole, ketoconazole, erythromycin, doxycycline, clarithromycin)
Decrease: action of chloroquine—magnesium, aluminum compounds, kaolin; do not use concurrently
Decrease: effects of ampicillin, rabies vaccine (ID)
Drug/Lab Test
Decrease: Hgb, platelets, WBC

NURSING CONSIDERATIONS

Assess:

Black Box Warning: **Infection:** resistance is common, not to be used for *P. falciparum* acquired in areas of resistance or where prophylaxis has failed

- Ophthalmic test if long-term treatment or dosage of >150 mg/day, baseline and periodically
- Blood studies: CBC, since blood dyscrasias occur
- **ECG** during therapy; watch for depression of T waves, widening of QRS complex
- **Allergic reactions:** pruritus, rash, urticaria
- **Blood dyscrasias:** malaise, fever, bruising, bleeding (rare)
- **For ototoxicity** (tinnitus, vertigo, change in hearing); audiometric testing should be done before, after treatment

⚠ **For toxicity:** blurring vision; difficulty focusing; headache; dizziness; decreased knee, ankle reflexes; seizures, CV collapse; product should be discontinued immediately and IV fluids given

Perform/provide:
- Storage in tight, light-resistant container at room temp; keep inj in cool environment

Evaluate:
- Therapeutic response: decreased symptoms of infection

Teach patient/family:
- To take with meals or immediately after meals
- To use sunglasses in bright sunlight to decrease photophobia
- That urine may turn rust or brown color
- To report hearing, visual problems; fever, fatigue, bruising, bleeding; may indicate blood dyscrasias

TREATMENT OF OVERDOSE:

Administer barbiturate (ultrashort-acting), vasopressor; tracheostomy may be necessary
- Keep away from pets, children, overdose is fatal

chlorpheniramine (OTC, Rx)

(klor-fen-ir'a-meen)

AHIST, Aller-Chlor, Allergy, Chlor-Pheniton, Chlor-Trimeton, Diabetic Tussin Allergy Relief, ED-Chlor-Tann, Equaline Allergy, Equate Chlortabs Allergy, Good Sense Allergy, Leader Allergy, P-Tann, Tana Hist-PD, Teldrin, Top Care Allergy, Wal-finate Allergy

Func. class.: Antihistamine (1st generation, nonselective)
Chem. class.: Alkylamine, H_1-receptor antagonist

Do not confuse:
Teldrin/Tedral

ACTION: Acts on blood vessels, GI system, respiratory system by competing with histamine for H_1-receptor site; decreases allergic response by blocking histamine

USES: Allergy symptoms, rhinitis, conjunctivitis (allergic)
Unlabeled uses: Nausea, vomiting due to motion sickness, pruritus, urticaria

CONTRAINDICATIONS:

Newborns/neonates

Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, increased intraocular pressure, cardiac/renal disease, hypertension, asthma, seizure disorder, hyperthyroidism, prostatic hypertrophy, GI obstruction, peptic ulcer disease, emphysema, hypersensitivity to H_1 receptor antagonists, lower respiratory tract disease, stenosed peptic ulcers, bladder neck obstruction, closed-angle glaucoma

DOSAGE AND ROUTES

• **Adult and child ≥12 yr: PO** 4 mg tid-qid, max 24 mg/day; **EXT REL** 8-12 mg bid-tid, max 24 mg/day

• **Child 6-12 yr: PO** 2 mg q4-6hr, max 12 mg/day; **EXT REL** 8 mg bedtime or daily, **EXT REL** not recommended for child <6 yr

Available forms: Chewable tabs 2 mg; tabs 4, 8, 12 mg; ext rel tabs 8, 12 mg; ext rel caps 8, 12 mg; syr 1 mg/5 ml, 2 mg/5 ml, 2.5 mg/5 ml

Administer:

• Avoid concurrent use with other CNS depressants

• Do not break, crush, or chew ext rel forms

• Without regard to meal

• Avoid use in children <6 yr

• **Syrup:** Use dosing utensil to measure correct dose

SIDE EFFECTS

CNS: *Dizziness, drowsiness,* poor coordination, fatigue, anxiety, euphoria, confusion, paresthesia, neuritis

EENT: Blurred vision; dilated pupils; tinnitus; nasal stuffiness; dry nose, throat, mouth

GI: Nausea, anorexia, diarrhea

GU: *Retention,* dysuria, urinary frequency

HEMA: Thrombocytopenia, agranulocytosis, hemolytic anemia

INTEG: Photosensitivity

RESP: Increased thick secretions, wheezing, chest tightness

PHARMACOKINETICS

Detoxified in liver, excreted by kidneys (metabolites/free drug), half-life 12-15 hr

PO: Onset ½ hr, duration 4-12 hr

PO-ER: Duration 8-24 hr

INTERACTIONS

Increase: CNS depression—barbiturates, opiates, hypnotics, tricyclics, alcohol

Increase: effect of chlorpheniramine—MAOIs

Increase: anticholinergic action—atropine, phenothiazines, quiNIDine, haloperidol

Drug/Lab Test

False negative: skin allergy tests

NURSING CONSIDERATIONS

Assess:

• Be alert for urinary retention, frequency, dysuria; product should be discontinued

• Respiratory status: rate, rhythm, increase in bronchial secretions, wheezing, chest tightness

Perform/provide:

• Hard candy, gum, frequent rinsing of mouth for dryness

• Storage in tight container at room temp

Evaluate:

• Therapeutic response: absence of running, congested nose, rashes, conjunctivitis

Teach patient/family:

• About all aspects of product use; to notify prescriber of confusion, sedation, hypotension, difficulty voiding

• To avoid driving, other hazardous activity if drowsiness occurs, especially geriatric patients

• To avoid concurrent use of alcohol

TREATMENT OF OVERDOSE:

Administer diazepam, vasopressors, phenytoin IV

chlorproMAZINE (Rx)

(klor-proe'ma-zeen)

Func. class.: Antipsychotic/antiemetic

Chem. class.: Phenothiazine-aliphatic

Do not confuse:
chlorproMAZINE/chlorproPAMIDE/prochlorperazine

ACTION: Depresses cerebral cortex, hypothalamus, limbic system, which control activity aggression; blocks neurotransmission produced by dopamine at synapse; exhibits a strong α-adrenergic, anticholinergic blocking action; mechanism for antipsychotic effects is unclear

USES: Psychotic disorders, mania, schizophrenia, anxiety, intractable hiccups in adults, nausea, vomiting; preoperatively for relaxation; acute intermittent porphyria, behavioral problems in children, nonpsychotic, demented patients, Tourette's syndrome

Unlabeled uses: Vascular headache, agitation, dementia, neonatal abstinence syndrome

CONTRAINDICATIONS: Children <6 mo, hypersensitivity, circulatory collapse, liver damage, cerebral arteriosclerosis, coronary disease, severe hypo/hypertension, blood dyscrasias, coma, brain damage, bone marrow depression, alcohol/barbiturate withdrawal, closed-angle glaucoma

Precautions: Pregnancy (C), breastfeeding, geriatric patients, seizure disorders, hypertension, hepatic/cardiac disease, prostatic enlargement, Parkinson's disease, pulmonary disease

Black Box Warning: Dementia. Increased mortality in geriatric patients with dementia-related psychosis

DOSAGE AND ROUTES

Psychosis

- **Adult: PO** 10-50 mg q1-4hr initially then increase up to 2 g/day if necessary; **IM** 10-50 mg q1-4hr, usual dose 300-800 mg/day
- **Geriatric:** 10-25 mg daily-bid, increase by 10-25 mg/day q4-7days, max 800 mg/day
- **Child >6 mo: PO** 0.55 mg/kg q4-6hr; **IM** 0.5 mg/kg q6-8hr

Nausea and vomiting

- **Adult: PO** 10-25 mg q4-6hr prn; **IM** 12.5-25 mg then 25-50 mg if no hypotension q3hr prn; q6-8hr prn, max 400 mg/day; **IV** 25-50 mg daily-qid
- **Child ≥6 mo: PO** 0.55 mg/kg q4-6hr; **IM** q6-8hr; **IM** ≤5 yr or ≤22.7 kg, 40 mg; max **IM** 5-10 yr or 22.7-45.5 kg, 75 mg

Intractable hiccups/Acute intermittent porphyria

- **Adult: PO** 25-50 mg tid-qid; **IM** 25-50 mg (only if PO dose does not work); **IV** 25-50 mg in 500-1000 ml **NS** (only for severe hiccups)

Available forms: Tabs 10, 25, 50, 100, 200 mg; inj 25 mg/ml

Administer:

- Anticholinergic agent for EPS if ordered

PO route

- With full glass of water, milk or with food to decrease GI upset
- Periodically attempt dosage reduction in those with behavioral problems

IM route

- Use gloves to prepare product, if product touches skin, wash with soap and water to prevent contact dermatitis
- IM, inject in deep muscle mass, do not give SUBCUT, no dilution needed; if irritation occurs, may dilute in NS or procaine 2%
- Avoid skin contact with injection solution—may cause contact dermatitis

IV route

Direct IV: After **diluting** 1 mg/1 ml with NS, **give** 1 mg or less/2 min or more, never give undiluted

Intermittent IV INF: Dilute 25-50 mg/500-1000 NS or other compatible large IV sol, **give** over ½ hour, protect from light

Syringe compatibilities: Atropine, benztropine, butorphanol, diphenhydrAMINE, doxapram, droperidol, fentaNYL, glycopyrrolate, HYDROmorphone, hydrOXYzine, meperidine, metoclopramide, midazolam, morphine, pentazocine, perphenazine, prochlorperazine, promazine, promethazine, scopolamine

Y-site compatibilities: Alfentanil, amikacin, amphotericin B lipid complex, amsacrine, anidulafungin, ascorbic acid injection, atenolol, atracurium, atropine, benztropine, bleomycin sulfate, buprenorphine, butorphanol, calcium chloride/gluconate, caspofungin, cimetidine, cisatracurium, CISplatin, cladribine, codeine, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexmedetomidine, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, doxacurium, DOXOrubicin, DOXOrubicin liposomal, doxycycline, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, erythromycin, esmolol, etoposide, famotidine, fenoldopam, fentaNYL, filgrastim, fluconazole, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, hydrocortisone, HYDROmorphone, hydrOXYzine, IDArubicin, ifosfamide, isoproterenol, labetalol, levofloxacin, lidocaine, LORazepam, LR, magnesium sulfate, mannitol, mechlorethamine, meperidine, methicillin, methoxamine, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, miconazole, midazolam, milrinone, minocycline, mitoXANtrone, morphine, multiple vitamins injection, mycophenolate mofetil, nafcillin, nalbuphine, naloxone, netilmicin, nitroglycerin, norepinephrine, octreotide, ondansetron, oxacillin, oxaliplatin, palonosetron, pamidronate, pancuronium, papaverine, penicillin G potassium, pentamidine, pentazocine, phytonadione, polymyxin B, potassium chloride, procainamide, prochlorperazine, promethazine, propofol, propranolol, protamine sulfate, pyridoxine, quiNIDine, quinupristin-dalfopristin, ranitidine, Ringer's injection, ritodrine, riTUXimab, rocuronium, sodium acetate, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiamine, thiotepa, tirofiban, TNA, tolazoline, TPN, trimetaphan, vancomycin, vasopressin, vecuronium, verapamil, vinCRIStine, vinorelbine, vitamin B complex with C, voriconazole, zoledronic acid

C

SIDE EFFECTS

CNS: *EPS: pseudoparkinsonism, akathisia, dystonia, tardive dyskinesia,* seizures, *headache,* neuroleptic malignant syndrome, dizziness

CV: *Orthostatic hypotension,* hypertension, cardiac arrest, ECG changes, tachycardia

EENT: Blurred vision, glaucoma, dry eyes

ENDO: SIADH

GI: *Dry mouth, nausea, vomiting, anorexia, constipation,* diarrhea, cholestatic jaundice, weight gain

GU: Urinary retention, enuresis, impotence, amenorrhea, gynecomastia, breast engorgement

HEMA: Anemia, leukopenia, leukocytosis, agranulocytosis

INTEG: *Rash,* photosensitivity, dermatitis

RESP: Laryngospasm, dyspnea, respiratory depression

SYST: Death in geriatric patients with dementia

PHARMACOKINETICS

Metabolized by liver, excreted in urine (metabolites), crosses placenta, enters breast milk, 95% bound to plasma proteins, elimination half-life 10-30 hr

PO: Absorption variable, widely distributed, onset erratic 30-60 min, duration 4-6 hr

PO-ER: Onset 30-60 min, peak unknown, duration 10-12 hr

IM: Well absorbed, peak 15-20 min, duration 4-8 hr

IV: Onset 5 min, peak 10 min, duration unknown

INTERACTIONS

Increase: CNS depression—other CNS depressants, alcohol, barbiturate anesthetics, antihistamines, sedatives/hypnotics, antidepressants
Increase: toxicity—EPINEPHrine
Increase: agranulocystosis—antithyroid agents
Increase: effects of both products—β-adrenergic blockers, alcohol
Increase: anticholinergic effects—anticholinergics, antidepressants, antiparkinsonian agents
Increase: valproic acid level
Decrease: seizure threshold—anticonvulsants
Decrease: absorption—aluminum hydroxide, magnesium hydroxide antacids
Decrease: antiparkinson activity—levodopa, bromocriptine
Decrease: serum chlorproMAZINE—lithium, barbiturates
Decrease: anticoagulant effect—warfarin

Drug/Lab Test

Increase: hepatic studies
Decrease: WBC, platelets, Hgb/HcT
False positive: pregnancy tests, PKU
False negative: urinary steroids, 17-OHCS

NURSING CONSIDERATIONS

Assess:

- Mental status: orientation, mood, behavior, presence and type of hallucinations before initial administration and monthly
- Any potentially reversible causes of behavior problems in geriatric patients before and during therapy
- Swallowing of PO medication; check for hoarding or giving of medication to other patients
- I&O ratio; palpate bladder if low urinary output occurs, especially in geriatric patients
- Bilirubin, CBC, LFTs, ocular exam; agranulocytosis, glaucoma, cholestatic jaundice may occur
- Respirations q4hr during initial treatment; establish baseline before starting treatment; report drops of 30 mm Hg; obtain baseline ECG; Q-wave and T-wave changes
- Dizziness, faintness, palpitations, tachycardia on rising

⚠ Neuroleptic malignant syndrome: hyperpyrexia, muscle rigidity, increased CPK, altered mental status, for acute dystonia (check chewing, swallowing, eyes, pill rolling)

- **EPS:** akathisia (inability to sit still, no pattern to movements), tardive dyskinesia (bizarre movements of the jaw, mouth, tongue, extremities), pseudoparkinsonism (rigidity, tremors, pill rolling, shuffling gait)
- Constipation, urinary retention daily; increase bulk, water in diet

Perform/provide:

- Supervised ambulation until stabilized on medication; do not involve in strenuous exercise program because fainting is possible; patient should not stand still for long periods
- Increased fluids, roughage to prevent constipation
- Candy, gum, sips of water for dry mouth
- Storage in tight, light-resistant container, oral sol in amber bottle

Evaluate:

- Therapeutic response: decrease in emotional excitement, hallucinations, delusions, paranoia; reorganization of patterns of thought, speech; increase in target behaviors

Teach patient/family:

- To use good oral hygiene; to use frequent rinsing of mouth, sugarless gum, candy, ice chips for dry mouth
- To avoid hazardous activities until product response is determined
- That orthostatic hypotension occurs often; to rise gradually from sitting or lying position
- To remain lying down for at least 30 min after IM inj
- To avoid hot tubs, hot showers, tub baths because hypotension may occur;

that, during hot weather, heat stroke may occur; to take extra precautions to stay cool
• To avoid abrupt withdrawal of product or EPS may result; product should be withdrawn slowly
• To avoid OTC preparations (cough, hay fever, cold) unless approved by prescriber since serious product interactions may occur; avoid use with alcohol, increased drowsiness may occur
• To use a sunscreen and sunglasses to prevent burns
• To take antacids 2 hr before or after this product
• To report sore throat, malaise, fever, bleeding, mouth sores; CBC should be drawn and product discontinued
• To employ contraceptive measures
• That urine may turn pink or reddish brown

TREATMENT OF OVERDOSE:

Lavage if orally ingested; provide airway; *do not induce vomiting or use EPINEPHrine*

cholestyramine (Rx)

(koe-less-tir'a-meen)

Prevalite, Questran, Questran Light

Func. class.: Antilipemic
Chem. class.: Bile acid sequestrant

Do not confuse:
Questran/Quarzan

ACTION:

Adsorbs, combines with bile acids to form insoluble complex that is excreted through feces; loss of bile acids lowers LDL, cholesterol levels

USES:

Primary hypercholesterolemia (esp. type IIa/IIb hyperlipoproteinemia), pruritus associated with biliary obstruction
Unlabeled uses: Diarrhea caused by excess bile acid

CONTRAINDICATIONS:

Hypersensitivity; complete biliary obstruction; hyperlipidemia III, IV, V
Precautions: Pregnancy (C), breastfeeding, children, PKU

C

DOSAGE AND ROUTES

• **Adult: PO** 4 g/day or bid, max 24 g/day
• **Child: PO** 240 mg/kg/day in 3 divided doses with food or drink, max 8 g/day titrated up over several weeks to decrease GI effects
Available forms: Powder for susp 4 g cholestyramine/packet or scoop; tab 1 g
Administer:
• Product daily or bid; give all other medications 1 hr before or 4-6 hr after cholestyramine to avoid poor absorption
• Product mixed with applesauce or stirred into beverage (2-6 oz), let stand for 2 min; do not take dry, avoid inhaling powder, avoid GI tube administration, take with food
• Supplemental doses of vit A, D, K if levels are low
• Doses are expressed in anhydrous cholestyramine resin, amount of resin varies with each product

SIDE EFFECTS

CNS: Headache, dizziness, drowsiness, vertigo, tinnitus, anxiety
GI: *Constipation, abdominal pain, nausea,* fecal impaction, hemorrhoids, flatulence, vomiting, steatorrhea, peptic ulcer
HEMA: Bleeding, increased PT
INTEG: Rash, irritation of perianal area, tongue, skin
META: Decreased vit A, D, K, red cell folate content; hyperchloremic acidosis
MS: Muscle, joint pain

PHARMACOKINETICS

PO: Excreted in feces, LDL lowered within 4-7 days, serum cholesterol lowered within 1 mo, duration 2-4 wk

INTERACTIONS

Decrease: absorption of warfarin; thiazides; cardiac glycosides; propranolol; corticosteroids; iron; thyroid hormones; acetaminophen; amiodarone; penicillin G; tetracyclines; clofibrate; gemfibrozil; oral vancomycin, glipiZIDE; vit A, D, E, K

Drug/Lab Test

Increase: AST, ALT, alk phos

Decrease: sodium, potassium

NURSING CONSIDERATIONS

Assess:

- Cardiac glycoside level if both products administered, may need to adjust dose of cardiac glycoside, if this product is increased or decreased
- For signs of vit A, D, K deficiency
- **Hypercholesterolemia:** fasting LDL, HDL, total cholesterol, triglyceride levels, electrolytes if receiving extended therapy; diet history
- **Pruritus:** for signs of itching
- Bowel pattern daily; increase bulk, water in diet for constipation; diarrhea may also occur

Evaluate:

- Therapeutic response: decreased LDL, cholesterol level (hyperlipidemia); diarrhea, pruritus (excess bile acids)

Teach patient/family:

- ⚠ About the symptoms of hypoprothrombinemia: bleeding mucous membranes, dark tarry stools, hematuria, petechiae; report immediately
- To take with food, never use dry
- That PKU patients should avoid Questran Light (contains aspartame and phenylalanine)
- About the importance of compliance
- That risk factors should be decreased: high-fat diet, smoking, alcohol consumption, absence of exercise
- That GI side effects will resolve with continued use

cidofovir (Rx)

(si-doh-foh'veer)

Vistide

Func. class.: Antiviral

Chem. class.: Nucleotide analog

ACTION: Suppresses cytomegalovirus (CMV) replication by selective inhibition of viral DNA synthesis

USES: CMV retinitis in patients with HIV; used with probenecid

Unlabeled uses: Adenovirus, condylomata acuminata, eczema vaccination, Epstein-Barr virus, generalized vaccinia, herpes genitalis/simplex, HPV, molluscum contagiosum, vaccinia necrosum, vaccinia, varicella-zoster, variola

CONTRAINDICATIONS: Hypersensitivity to this product, probenecid, sulfa products; direct intraocular injection

Black Box Warning: Proteinuria, renal disease/failure

Precautions: Pregnancy (C), breastfeeding, children <6 mo, geriatric patients, preexisting cytopenias, renal function impairment, platelet count $<25{,}000/mm^3$

Black Box Warning: Neutropenia, infertility, secondary malignancy

DOSAGE AND ROUTES

- **Adult: IV** 5 mg/kg q wk × 2 wk then 3 mg/kg q2wk, give with probenecid

Renal dose

- **Adult: IV** CCr <55 ml/min, do not use; SCr increase of 0.3-0.4 mg/dl above baseline, decrease dose to 3 mg/kg; SCr increase of ≥0.5 mg/dl above baseline or ≥21 proteinuria, discontinue

Available forms: Inj 75 mg/ml

Administer:

Black Box Warning: Use cytotoxic handling procedures

- Allow to warm to room temperature
- If product comes in contact with skin, wash with soap and water immediately
- If zidovudine is used, reduce dose to 50% on cidofovir treatment days

Intermittent IV INF route

- **Dilute** in 100 ml 0.9% saline sol before administration; probenecid must be given PO 2 g 3 hr before the cidofovir inf and 1 g at 2 and 8 hr after ending the cidofovir inf; **give** 1 L of 0.9% saline sol IV with each INF of cidofovir, give saline INF over 1-2 hr period immediately before cidofovir; patient should be given a 2nd L if the patient can tolerate the fluid load (2nd L given at time of cidofovir or immediately afterward, should be given over 1-3 hr)
- **Give** slowly; do not give by bolus IV, SUBCUT inj
- Use diluted sol within 24 hr, do not freeze; do not use sol with particulate matter or discoloration
- Do not admix

SIDE EFFECTS

CNS: *Fever, chills,* coma, confusion, abnormal thoughts, *dizziness,* bizarre dreams, *headache,* psychosis, tremors, somnolence, paresthesia, *amnesia, anxiety, insomnia,* seizures
CV: Dysrhythmias, hypo/hypertension
EENT: Retinal detachment with CMV retinitis
GI: Abnormal LFTs, *nausea, vomiting, anorexia, diarrhea,* abdominal pain, hemorrhage
GU: Hematuria, increased creatinine, BUN, nephrotoxicity
HEMA: Granulocytopenia, thrombocytopenia, irreversible neutropenia, anemia, eosinophilia
INTEG: *Rash, alopecia, pruritus, acne,* urticaria, pain at inj site, phlebitis
RESP: Dyspnea

PHARMACOKINETICS

Terminal half-life 2.6 hr

INTERACTIONS

Black Box Warning: Nephrotoxicity: amphotericin B, foscarnet, aminoglycosides, pentamidine IV, NSAIDs, salicylates; wait 7 days after use to begin cidofovir

C

NURSING CONSIDERATIONS

Assess:

- Culture before treatment is initiated; cultures of blood, urine, and throat may all be taken; CMV not confirmed by this method; diagnosis made by ophthalmic exam

Black Box Warning: Renal, hepatic, increased hemopoietic studies, BUN; serum creatinine, AST, ALT, creatinine, CCr, A-G ratio, baseline and drip treatment, blood counts should be done q2wk; watch for decreasing granulocytes, Hgb; if low, therapy may have to be discontinued and restarted after hematologic recovery; blood transfusions may be required, renal failure can occur also, Fancom syndrome

- For GI symptoms: severe nausea, vomiting, diarrhea; severe symptoms may necessitate discontinuing product
- Electrolytes and minerals: calcium, phosphorus, magnesium, sodium, potassium; watch closely for tetany during 1st administration

Black Box Warning: Blood dyscrasias (anemia, granulocytopenia); bruising, fatigue, bleeding, poor healing; leukopenia, neutropenia, thrombocytopenia: WBCs, platelets q2days during 2 ×/day dosing and every wk thereafter; check for leukopenias with daily WBC count in patients with prior leukopenia, with other nucleoside analogs, or for whom leukopenia counts are <1000 cells/mm^3 at start of treatment

- Allergic reactions: flushing, rash, urticaria, pruritus
- Monitor serum creatinine or CCr at least q2wk; give only to those with creatinine levels ≤ 1.5 mg/dl, CCr >55 ml/min, urine protein <100 mg/dl

Evaluate:
- Therapeutic response: decreased symptoms of CMV

Teach patient/family:
- To notify prescriber if sore throat, swollen lymph nodes, malaise, fever occur; may indicate other infections
- To report perioral tingling, numbness in extremities, paresthesias; report rash immediately
- That serious product interactions may occur if OTC products are ingested; check with prescriber
- That product is not a cure but will control symptoms
- That regular ophthalmic exams, renal studies must be continued
- That major toxicities may necessitate discontinuing product
- To use contraception during treatment; that infertility may occur; and that men should use barrier contraception for 90 days after treatment

TREATMENT OF OVERDOSE:
Discontinue product; use hemodialysis, increase hydration

cilostazol (Rx)
(sih-los'tah-zol)
Pletal
Func. class.: Platelet aggregation inhibitor
Chem. class.: Quinolinone derivative

Do not confuse:
Pletal/Plendil

ACTION:
Reversibly inhibits cellular phosphodiesterase; inhibits platelet aggregation induced by thrombin, ADP, collagen, arachidonic acid, EPINEPHrine, stress

USES:
Intermittent claudication
Unlabeled uses: Buerger's disease, percutaneous coronary intervention (PCI)

CONTRAINDICATIONS:
Hypersensitivity, acute MI, active bleeding conditions, hemostatic conditions
Black Box Warning: CHF

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, previous hepatic disease, cardiac/renal disease, increased bleeding risk, low platelet count, platelet dysfunction

DOSAGE AND ROUTES
- **Adult: PO** 100 mg bid taken ≥30 min before or 2 hr after breakfast and dinner or 50 mg bid if using products that inhibit CYP3A4 and CYP2C19; 12 wk of treatment may be needed for beneficial effect

PCI to prevent acute coronary thrombosis/Buerger's disease (unlabeled)
- **Adult: PO** 100 mg bid

Available forms: Tabs 50, 100 mg
Administer:
- Give bid 30 min before or 2 hr after meals; do not give with grapefruit juice

SIDE EFFECTS
CNS: *Dizziness,* headache
CV: *Palpitations, tachycardia,* nodal dysrhythmia, postural hypotension
EENT: Blindness, diplopia, ear pain, tinnitus, retinal hemorrhage
GI: *Nausea,* vomiting, *diarrhea,* GI discomfort, colitis, cholelithiasis, ulcer, esophagitis, gastritis, anorexia, *flatulence, dyspepsia*
GU: Cystitis, frequency, vaginitis, vaginal hemorrhage, hematuria
HEMA: Bleeding (epistaxis, hematuria, retinal hemorrhage, GI bleeding), thrombocytopenia, anemia, polycythemia, aplastic anemia
INTEG: *Rash,* urticaria, dry skin, Stevens-Johnson syndrome
MISC: *Back pain, headache, infection, myalgia, peripheral edema,* chills, fever, malaise, diabetes mellitus
RESP: *Cough, pharyngitis, rhinitis,* asthma, pneumonia

PHARMACOKINETICS

95%-98% protein binding; metabolism: hepatic extensively by CYP3A4, 2C19 enzymes; excreted in urine (74%), feces (20%); half-life 11-13 hr

INTERACTIONS

Increase: bleeding tendencies—anticoagulants, NSAIDs, thrombolytics, abciximab, eptifibatide, tirofiban, ticlopidine
Increase: cilostazol levels—CYP3A4, CYP2C19 inhibitors; diltiazem, erythromycin, clarithromycin, verapamil, protease inhibitors, omeprazole; exercise caution when coadministering with fluvoxaMINE, FLUoxetine, ketoconazole, isoniazid, gemfibrozil, omeprazole, itraconazole, voriconazole, fluconazole; reduce dose to 50 mg bid
Decrease: cilostazol levels—CYP3A4 inducers

Drug/Herb

Decrease: action—chamomile, coenzyme Q10, flax, goldenseal, St. John's wort

Drug/Food

• Do not use with grapefruit juice, toxicity may occur

NURSING CONSIDERATIONS

Assess:

Black Box Warning: For underlying CV disease because CV risk is great; for CV lesions with repeated oral administration; do not administer to patients with CHF of any severity; for severe headache, signs of toxicity

• Blood studies: CBC q2wk, Hct, Hgb, PT

Evaluate:

• Therapeutic response: improved walking distance, duration; decreased pain

Teach patient/family:

• To avoid hazardous activities until effect is known
• To report any unusual bleeding
• To report side effects such as diarrhea, skin rashes, subcutaneous bleeding
• That effects may take 2-4 wk; treatment of up to 12 wk may be required for necessary effect
• That reading the patient package insert is necessary
• That it is best to discontinue tobacco use, not to use grapefruit juice
• That there are many drug and herb interactions; obtain approval from prescriber before use

C

cimetidine (OTC, Rx)

(sye-met'i-deen)

Acid Reducer, Equaline Acid Reducer, Good Sense Heartburn Relief, Nu-Cimet ✤, Tagamet, Tagamet HB

Func. class.: H_2-histamine receptor antagonist

Chem. class.: Imidazole derivative

ACTION: Inhibits histamine at H_2-receptor site in the gastric parietal cells, which inhibits gastric acid secretion

USES: Short-term treatment of duodenal and gastric ulcers and maintenance; management of GERD (PO) and Zollinger-Ellison syndrome; prevention of upper GI bleeding; prevent, relieve heartburn, acid indigestion, upper GI bleeding
Unlabeled uses: Prevention of aspiration pneumonitis, stress ulcers, angioedema, molluscum contagiosum, NSAID-induced ulcer prophylaxis, verruca vulgaris

CONTRAINDICATIONS: Hypersensitivity
Precautions: Pregnancy (B), breastfeeding, children <16 yr, geriatric patients, organic brain syndrome, renal/hepatic disease

DOSAGE AND ROUTES

Short-term treatment of active ulcers

• **Adult/adolescents ≥16 yr: PO** 300 mg qid with meals, at bedtime × 8 wk or 400 mg bid, 800 mg at bedtime; after 8

wk, give bedtime dose only; **IV BOL** 300 mg/20 ml 0.9% NaCl over 1-2 min q6hr; **IV INF** 300 mg/50 ml D_5W over 15-20 min; **IM** 300 mg q6hr, max 2400 mg/day
• **Child: PO** 20-40 mg/kg/day; **IM/IV** 5-10 mg/kg q6-8hr

Prophylaxis of duodenal ulcer
• **Adult and child >16 yr:** 400 mg at bedtime or 300 mg bid

GERD
• **Adult: PO** 800-1600 mg/day in divided doses × up to 12 wk

Hypersecretory conditions (Zollinger-Ellison syndrome)
• **Adult: PO/IM/IV** 300-600 mg q6hr; may increase to 12 g/day if needed; OTC use ≤200 mg daily or bid, max 2×/wk

Upper GI bleeding prophylaxis
• **Adult: IV** 50 mg/hr; lowered in renal disease

Heartburn
• **Adult/child ≥12 yrs: PO** 200 mg Tagamet Hb up to BID, may use before eating, max 400 mg/day, max daily use up to 2 wk

Renal disease
• **Adult: PO/IV** CCr <30 ml/min, 300 mg q12hr

Verruca vulgaris (unlabeled)
• **Child: PO** 30-40 mg/kg/day × 2 mo

Available forms: Tabs 100, 200, 300, 400, 800 mg; liq 200, 300 mg/5 ml; inj 300 mg/2 ml, 300 mg/50 ml 0.9% NaCl

Administer:

PO route
• With meals for prolonged product effect; antacids 1 hr before or 1 hr after cimetidine

IM route
• May give undiluted
• Give at end of dialysis
• Inject deeply in large muscle mass, aspirate

IV route
• After **diluting** 300 mg/20 ml of 0.9% NaCl for inj; give by **direct IV over** ≥5 min; **Intermittent IV INF** may be **diluted** 300 mg/50 ml of D_5W; **run** ≥30 min; or total daily dose (900 mg) diluted in 100-1000 ml D_5W given over 24 hr

Continuous IV INF
• Storage of diluted sol at room temp up to 48 hr

Y-site compatibilities: Acyclovir, alfentanil, amifostine, amikacin, aminocaproic acid, aminophylline, amphotericin B lipid complex/liposome, anakinra, anidulafungin, ascorbic acid injection, atenolol, atracurium, atropine, aztreonam, benztropine, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, caspofungin, cefamandole, ceFAZolin, cefmetazole, cefonicid, cefotaxime, cefoTEtan, cefOXitin, ceftAZidime, ceftizoxime, cefTRIAXone, cefuroxime, cephalothin, cephapirin, chlorproMAZINE, cisatracurium, CISplatin, cladribine, clarithromycin, clindamycin, codeine, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, dexmedetomidine, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, doripenem, doxacurium, doxapram, DOXOrubicin, DOXOrubicin liposome, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, epoetin alfa, eptifibatide, ertapenem, erythromycin, esmolol, etoposide, famotidine, fenoldopam, fentaNYL, filgrastim, fluconazole, fludarabine, fluorouracil, folic acid, foscarnet, gallium, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, heparin, hydrocortisone, HYDROmorphone, hydrOXYzine, IDArubicin, ifosfamide, imipenem-cilastatin, irinotecan, isoproterenol, ketorolac, labetalol, levofloxacin, lidocaine, linezolid, LORazepam, LR, magnesium sulfate, mannitol, mechlorethamine, melphalan, meperidine, metaraminol, meropenem, methicillin, methotrexate, methoxamine, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, mezlocillin, miconazole, midazolam, milrinone, minocycline, mitoXANtrone, morphine, moxalactum, multiple vitamin injection, mycopheno-

late, nafcillin, nalbuphine, naloxone, nesiritide, netilmicin, niCARdipine, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxacillin, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pamidronate, pancuronium, pantoprazole, papaverine, PEMEtrexed, penicillin G sodium/potassium, pentamidine, pentazocine, phenylephrine, phytonadione, pipercillin, piperacillin/tazobactam, polymyxin B, potassium chloride, procainamide, prochlorperazine, promethazine, propofol, propranolol, protamine, pyridoxine, quiNIDine, quinupristin-dalfopristin, ranitidine, remifentanil, Ringers' ritodrine, riTUXimab, rocuronium, sargramostim, sodium acetate/bicarbonate, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiamine, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, TNA, tobramycin, tolazoline, topotecan, TPN, trastuzumab, trimetaphan, urokinase, vancomycin, vasopressin, vecuronium, verapamil, vinCRIStine, vinorelbine, voriconazole, zidovudine, zoledronic acid

SIDE EFFECTS

CNS: *Confusion, headache,* depression, dizziness, anxiety, weakness, psychosis, tremors, seizures

CV: Bradycardia, tachycardia, dysrhythmias

GI: *Diarrhea,* abdominal cramps, paralytic ileus, jaundice

GU: Gynecomastia, galactorrhea, impotence, increase in BUN, creatinine

HEMA: Agranulocytosis, thrombocytopenia, neutropenia, aplastic anemia, increase in PT

INTEG: Urticaria, rash, alopecia, sweating, flushing, exfoliative dermatitis

RESP: Pneumonia

PHARMACOKINETICS

Half-life 1½-2 hr; 30%-40% metabolized by liver, excreted in urine (unchanged), crosses placenta, enters breast milk

PO: Onset 30 min, peak 45-90 min; duration 4-5 hr, well absorbed

IM/IV: Onset 10 min, peak ½ hr, duration 4-5 hr, well absorbed (IM)

C

INTERACTIONS

Increase: toxicity due to CYP450 pathway—benzodiazepines, β-blockers, calcium channel blockers, carBAMazepine, chloroquine, lidocaine, metroNIDAZOLE, moricizine, phenytoin, quiNIDine, quiNINE, sulfonylureas, theophylline, tricyclics, valproic acid, warfarin

Increase: bone marrow suppression-carmustine

Decrease: absorption of cimetidine—antacids, sucralfate

Decrease: absorption—ketoconazole, itraconazole

Drug/Lab Test

Increase: alk phos, AST, creatinine, prolactin

False positive: gastroccult, hemoccult tests

False negative: TB skin tests

NURSING CONSIDERATIONS

Assess:

- **Ulcer symptoms:** epigastric pain, duration, intensity; aggravating, ameliorating factors

Evaluate:

- Therapeutic response: decreased pain in abdomen; healing of ulcers; absence of gastroesophageal reflux, gastric pH of 5

Teach patient/family:

- That gynecomastia, impotence may occur, are reversible
- To avoid driving, other hazardous activities until stabilized on this medication; drowsiness or dizziness may occur
- To avoid OTC preparations: aspirin; cough, cold preparations; condition may worsen
- That smoking decreases effectiveness of product
- That product must be taken exactly as prescribed and continued for prescribed time to be effective; not to double dose

• To report bruising, fatigue, malaise; blood dyscrasias may occur
• To report diarrhea, black tarry stools, sore throat, rash to prescriber

cinacalcet (Rx)

(sin-a-kal'set)

Sensipar

Func. class.: Calcium receptor agonist

Chem. class.: Polypeptide hormone

ACTION: Directly lowers PTH levels by increasing sensitivity of calcium-sensing receptors to extracellular calcium

USES: Hypercalcemia with parathyroid carcinoma, secondary hyperparathyroidism with chronic kidney disease for patient on dialysis, primary hyperparathyroidism

CONTRAINDICATIONS: Hypersensitivity, hypocalcemia
Precautions: Pregnancy (C), breastfeeding, children, seizure disorders, hepatic disease

DOSAGE AND ROUTES

Parathyroid carcinoma
• **Adult: PO** 30 mg bid, titrate q2-4wk, with sequential doses of 30 mg bid, 60 mg bid, 90 mg bid, 90 mg tid-qid to normalize calcium levels
Secondary hyperparathyroidism
• **Adult: PO** 30 mg/day, titrate no more frequently than q2-4wk with sequential doses of 30, 60, 90, 120, 180 mg/day
Available forms: Tabs 30, 60, 90 mg
Administer:
• Swallow tabs whole; do not break, crush, or chew; use with food or right after a meal
• Can be used alone or in combination with vit D sterols, phosphate binders
• Storage at <77° F (25° C)

Secondary hyperthyroidism
• Titrate q2-4wk to target iPTH consistent with National Kidney Foundation–Kidney Disease Outcomes Quality Initiative (NKF-K/DOQI) for chronic kidney disease patient on dialysis of 150-300 pg/ml; if iPTH <150-300 pg/ml, reduce dose of cinacalcet and/or vit D sterols or discontinue treatment

SIDE EFFECTS

CNS: Dizziness, asthenia, seizures, tetany, hallucinations, depression
CV: Hypertension, dysrhythmia exacerbation
GI: Nausea, diarrhea, vomiting, anorexia
MISC: Access infection, noncardiac chest pain, hypocalcemia
MS: Myalgia

PHARMACOKINETICS

93%-97% bound to plasma; proteins metabolized by CYP3A4, 2D6, 1A2; half-life 30-40 hr; renal excretion of metabolites (80% renal, 15% in feces)

INTERACTIONS

Increase: cinacalcet levels: CYP3A4 inhibitors (ketoconazole, erythromycin, itraconazole)
Increase: levels of CYP2D6 inhibitors (flecainide, vinBLAStine, thioridazine, tricyclics)
Drug/Food
Increase: action by high-fat meal

NURSING CONSIDERATIONS

Assess:
• **Hypocalcemia:** cramping, seizures, tetany, myalgia, paresthesia; calcium, phosphorous within 1 wk and iPTH 1-4 wk after initiation or dosage adjustment when maintenance established; measure calcium, phosphorus monthly; iPTH q1-3mo, target range 150-300 pg/ml for iPTH level; biochemical markers of bone formation/resorption; radiologic evidence of fracture; serum testosterone
• **Renal disease (without dialysis): These patients should not receive**

Treatment with this product, high risk of hypocalcemia
- If calcium <8.4 mg/dl, do not start therapy

Evaluate:
- Therapeutic response: calcium levels 9-10 mg/dl, decreasing symptoms of hypercalcemia

Teach patient/family:
- To take with food or shortly after a meal, to take tabs whole
- To report cramping, seizures, muscle pain, tingling, tetany immediately

ciprofloxacin (Rx)

(sip-ro-floks'a-sin)

Cipro, Cipro XR

Func. class.: Antiinfective—broad spectrum

Chem. class.: Fluoroquinolone

Do not confuse:
ciprofloxacin/cephalexin

ACTION: Interferes with conversion of intermediate DNA fragments into high-molecular-weight DNA in bacteria; DNA gyrase inhibitor

USES: Infection caused by susceptible *Escherichia coli, Enterobacter cloacae, Proteus mirabilis, Klebsiella pneumoniae, Proteus vulgaris, Citrobacter freundii, Serratia marcescens, Pseudomonas aeruginosa, Staphylococcus aureus, Staphylococcus epidermidis, Enterobacter, Campylobacter jejuni, Salmonella;* chronic bacterial prostatitis, acute sinusitis, postexposure inhalation anthrax, infectious diarrhea, typhoid fever, complicated intraabdominal infections, nosocomial pneumonia, urinary tract infections

Unlabeled uses: *Acinetobacter/woffii, Aeromonas hydrophila,* brucellosis, *Burkholderia, pseudomallei,* chancroid, cholera, dental infection, *Edwardsiella tarda,* endocarditis, *Enterobacter aerogenes,* granuloma inguinale, *Klebsiella oxytoca,* Legionnaire's disease, melioidosis, meningococcal infection prophylaxis, *Pasteurella multocida,* PID, periodontitis, pharyngitis, *Salmonella sp., Stenotrophomonas maltophilia,* tularemia, *Vibrio cholerae/parahaemolyticus/vulnificus, Yersinia enterocolitica*

CONTRAINDICATIONS: Hypersensitivity to quinolones

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, renal disease, epilepsy, QT prolongation, hypokalemia

Black Box Warning: Tendon pain/rupture, tendinitis

DOSAGE AND ROUTES

Uncomplicated urinary tract infections
- **Adult: PO** 250 mg q12hr × 3 days or 500 mg q24hr × 3 days

Complicated/severe urinary tract infections
- **Adult: PO** 500 mg q12hr or 1000 mg q24hr × 7-14 days; **IV** 400 mg q12hr

Pyelonephritis, acute uncomplicated
- **Adult: PO** 1000 mg q24hr × 7-14 days q4-6wk

Respiratory, bone, skin, joint infections
- **Adult: PO** 500-750 mg q12hr × 7-14 days; **IV** 400 mg q12hr

Nosocomial pneumonia
- **Adult: IV** 400 mg q8hr × 10-14 days

Intraabdominal infections, complicated
- **Adult: PO** 500 mg q12hr × 7-14 days; **IV** 400 mg q12hr × 7-14 days, usually given with metroNIDAZOLE

Acute sinusitis, mild/moderate
- **Adult: PO** 500 mg q12hr × 10 days; **IV** 400 mg q12hr × 10 days

Inhalational anthrax (postexposure)
- **Adult: PO** 500 mg q12hr × 60 days; **IV** 400 mg q12hr × 60 days
- **Child: PO** 15 mg/kg/dose q12hr × 60 days, max 500 mg/dose; **IV** 10 mg/kg q12hr, max 400 mg/dose

Infectious diarrhea
• **Adult: PO** 500 mg q12hr × 5-7 days
Chronic bacterial prostatis
• **Adult: PO** 500 mg q12hr × 28 days; **IV** 400 mg q12hr × 28 days
Renal disease
• **Adult:** CCr 30-50 ml/min, **PO** 250-500 mg q12hr; CCr 5-29 ml/min, **PO** 250-500 mg q18hr; **IV** 200-400 mg q18-24hr
Available forms: Tabs 100, 250, 500, 750 mg; ext rel tabs (XR) 500, 1000 mg; inj 200 mg/20 ml, 400 mg/40 ml, 200 mg/100 ml D_5, 400 mg/200 ml D_5; oral susp 250 mg, 500 mg/5 ml
Administer:
• Obtain C&S before use
• Do not use theophylline with this product, will cause toxicity
• Use caution when giving with antidysrhythmics IA, III
PO route
• Do not break, crush, chew XR (ext rel) product, use adequate fluids to prevent crystalluria
• 2 hr before or 2 hr after antacids, zinc, iron, calcium
• Do not give oral susp by GI tube
IV route
• Over 1 hr as an inf, comes in premixed plastic inf container or diluted 20- or 40-ml vial to a final conc of 0.5-2 mg/ml of NS or D_5W; give through Y-tube or 3-way stopcock

Y-site compatibilities: Amifostine, anakinra, anidulafungin, atenolol, aztreonam, bivalirudin, bleomycin, calcium gluconate, CARBOplatin, caspofungin, ceftAZidime, cisatracurium, CISplatin, clarithromycin, codeine, cytarabine, DACTINomycin, DAPTOmycin, dexmedetomidine, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, doripenem, DOPamine, doxacurium, DOXOrubicin, epirubicin, eptifibatide, ertapenem, etoposide, fenoldopam, fludarabine, gallium, gemcitabine, gentamicin, granisetron, HYDROmorphone, hydrOXYzine, IDArubicin, ifosfamide, irinotecan, lidocaine, linezolid, LORazepam, LR, mechlorethamine, meperidine, methotrexate, metoclopramide, metroNIDAZOLE, midazolam, midodrine, milrinone, mitoXANtrone, mycophenolate, nesiritide, octreotide, ondansetron, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pamidronate, pancuronium, piperacillin, potassium acetate/chloride, promethazine, ranitidine, remifentanil, rocuronium, sodium chloride, tacrolimus, teniposide, thiotepa, tigecycline, tirofiban, TNA, tobramycin, trastuzumab, vasopressin, vecuronium, verapamil, vinCRIStine, vinorelbine, voriconazole

SIDE EFFECTS

CNS: *Headache*, dizziness, fatigue, insomnia, depression, *restlessness*, seizures, confusion
GI: *Nausea, diarrhea*, increased ALT/AST, dry mouth, flatulence, heartburn, *vomiting*, oral candidiasis, dysphagia, pseudomembranous colitis
GU: Crystalluria, interstitial neuritis
HEMA: Bone marrow depression
INTEG: *Rash*, pruritus, urticaria, photosensitivity, flushing, fever, chills, toxic epidermal necrolysis
MISC: Anaphylaxis, Stevens-Johnson syndrome, visual impairment, QT prolongation, pseudotumor cerebri
MS: Tremor, arthralgia, tendinitis, tendon rupture

PHARMACOKINETICS

PO: Peak 1 hr; half-life 3-4 hr; excreted in urine as active product, metabolites 35%-40%, 20%-40% protein binding

INTERACTIONS

Black Box Warning: Increase: tendonitis, tendon rupture—Corticosteroids
Increase: nephrotoxicity—cycloSPORINE
Increase: ciprofloxacin levels—probenecid; monitor for toxicity
Increase: levels of theophylline, warfarin, monitor blood levels, reduce dose
Increase: QT prolongation—astemizole, droperidol, class IA/III antidysrhythmics, tricyclics, tetracyclines, local anesthetics,

phenothiazines, haloperidol, risperiDONE, sertindole, ziprasidone, alfuzosin, arsenic trioxide, b-agonists, chloroquine, cloZAPine, cyclobenzapine, dasatinib, dolasetron, droperidol, flecainide, halogenated anesthetics, lapatinib, levomethadyl, macrolides, methadone, octreotide, ondansetron, paliperidone, palonosetron, pentamidine, propafenone, ranolazine, SUNItinib, tacrolimus, terfenadine, vardenafil, vorinostat; less likely than other quinolones

Decrease: ciprofloxacin absorption—antacids that contain magnesium, aluminum; zinc, iron, sucralfate, enteral feedings, calcium

Drug/Food

Increase: effect of caffeine

Decrease: absorption—dairy products, food

Drug/Lab Test

Increase: AST, ALT, BUN, creatinine, LDH, bilirubin, alk phos, glucose, proteinuria, albuminuria

Decrease: WBC, glucose

NURSING CONSIDERATIONS

Assess:

- **Infection:** WBC, temperature before treatment, periodically

Black Box Warning: Myasthenia gravis: Avoid use in these patients, increases muscle weakness

- **CNS symptoms:** headache, dizziness, fatigue, insomnia, depression
- Renal, hepatic studies: BUN, creatinine, AST, ALT
- I&O ratio, urine pH <5.5 is ideal

Black Box Warning: Tendonitis, tendon rupture: Discontinue as first sign of tendon pain, inflammation; increased in those >60 yr, those taking corticosteroids, organ transplants

Anaphylaxis: fever, flushing, rash, urticaria, pruritus, dyspnea

- **Pseudomotor Cerebri:** May occur at excessive doses

Perform/provide:

- Limited intake of alkaline foods, products: milk, dairy products, alkaline antacids, sodium bicarbonate; caffeine intake if excessive cardiac or CNS stimulation
- Increase in fluids to 3 L/day to avoid crystallization in kidneys

Evaluate:

- Therapeutic response: decreased pain, frequency, urgency, C&S; absence of infection

Teach patient/family:

- Not to take any products that contain magnesium, calcium (such as antacids), iron, aluminum with this product or within 2 hr of product, to drink fluids to prevent crystals in urine

Black Box Warning: To report tendon pain, chest pain, palpitations

- To ambulate, perform activities with assistance if dizziness occurs
- To complete full course of product therapy; not to double or miss doses
- To notify prescriber if rash occurs, discontinue product
- To notify prescriber if pregnancy is planned or suspected pregnancy (C), do not breastfeed
- To frequently rinse mouth; use sugarless candy, gum for dry mouth
- To contact prescriber if taking theophylline

ciprofloxacin (ophthalmic)

(sip-roe-flox'a-sin)

Ciloxan

Func. class.: ophthalmic anti-infective

Chem. class.: fluoroquinolone

Do not confuse: ciprofloxacin/gatifloxacin/levofloxacin/moxifloxacin/ofloxacin

ACTION: Inhibits DNA gyrase, thereby decreasing bacterial replication

USES: Corneal ulcers, bacterial conjunctivitis

CONTRAINDICATIONS:
Hypersensitivity to this product or fluoroquinolones

Precautions: Pregnancy (C), breastfeeding

DOSAGE AND ROUTES

Bacterial conjunctivitis

• **Adult/adolescent/child ≥1 yr:** Ophthalmic (sol): 1-2 drops in affected eye(s) every 2 hr while awake × 2 days, then every 4 hr while awake for the next 5 days

• **Adult/adolescent/child ≥2 yr:** Ophthalmic (ointment): 1/2-inch ribbon to conjunctival sac tid × 2 days, then 1/2 inch bid for next 5 days

Ophthalmic infection associated with corneal ulcer

• **Adult/adolescent/child ≥1 yr:** Ophthalmic (solution): 2 drops in affected eye(s) every 15 min × 6 hr, then every 30 min for the remainder of the first day; for the second day, 2 drops every hr; for days 3-14, 2 drops every 4 hr

Available forms: Ophthalmic ointment, solution 0.3%

Administer

• Commercially available ophthalmic solutions are not for injection subconjunctivally or into the anterior chamber of the eye

Ophthalmic route

• Apply topically to the eye, taking care to avoid contamination

• Do not touch the tip of the dropper to the eye, fingertips, or other surface

• Apply pressure to lacrimal sac for 1 min after instillation

• Avoid wearing contact lens(es) while treating eye infection

SIDE EFFECTS

EENT: Burning, hypersensitivity, pruritus, precipitate in those with corneal ulcers

NURSING CONSIDERATIONS

Assess:

Allergic reaction:

• Assess for hypersensitivity, discontinue product

Evaluate:

• Decreased ophthalmic infection

Teach patient/family:

Ophthalmic route:

• To apply topically to the eye, taking care to avoid contamination; for ophthalmic use only

• Not to touch the tip of the dropper to the eye, fingertips, or other surface

• To apply pressure to lacrimal sac for 1 min after instillation

• To avoid wearing contact lens(es) while treating eye infection

cisatracurium

(sis-ah-trah-kyoo'ree-um)

Nimbex

Func. class.: skeletal muscle relaxant

Chem. class.: nondepolarizing neuromuscular blocker

ACTION:
Antagonizes acetylcholine by binding to cholinergic receptors on the motor end plate, resulting in neuromuscular blockade

USES:
To maintain neuromuscular blockade during mechanical ventilation and as an adjunct to general anesthesia

CONTRAINDICATIONS:
Hypersensitivity

Precautions: Pregnancy (B), breastfeeding, children, benzyl alcohol hypersensitivity, electrolyte imbalances, long-term use in ICU, trauma or burns

DOSAGE AND ROUTES

For neuromuscular blockade, as an adjunct to general anesthesia, to facilitate endotracheal intubation and to provide skeletal muscle relaxation during surgery or mechanical ventilation in the ICU

Endotracheal intubation

- **Adult/adolescent (healthy): IV** 0.15-0.2 mg/kg, one time
- **Adult with myasthenia gravis: IV** Use peripheral nerve stimulator monitoring and an initial dose ≤0.02 mg/kg
- **Child 2-12 yr: IV** 0.1-0.15 mg/kg over 5-10 sec during either halothane or opioid anesthesia
- **Infant/child ≤23 mo: IV** 0.15 mg/kg over 5-10 sec during either halothane or opioid anesthesia

To maintain neuromuscular blockade during prolonged surgical procedures:

- **Adult/adolescent/child ≥2 yr (healthy): IV** Maintenance dose 0.03 mg/kg; maintenance dosing is generally required 40-50 min after an initial dose of 0.15 mg/kg IV or 50-60 min after an initial dose of 0.2 mg/kg; the need for maintenance doses should be determined by clinical criteria

Available forms: Injection solution 2, 10 mg/ml

Administer

IV route

- Visually inspect for particulate matter and discoloration before use
- Only experienced clinicians, familiar with the use of neuromuscular blocking drugs, should administer or supervise the use this product
- Use by rapid IV injection or by continuous IV infusion

IV INJ route

- Inject IV over 5-10 sec

Continuous IV INF route

- Dilute with NS, D_5W, or D_5NS (0.1-0.4 mg/ml); adjust the rate of infusion according to peripheral nerve stimulation
- The amount of inf sol required per minute depends on the concentration of cisatracurium in the inf sol, the desired dose of cisatracurium, and the patient's weight
- Store Nimbex injection diluted to 0.1 mg/ml either under refrigeration or at room temperature for 24 hr; dilutions to 0.1 mg/ml or 0.2 mg/ml in D_5W/LR injection may be stored under refrigeration for 24 hr

SIDE EFFECTS

CV: Bradycardia, flushing, hypotension
RESP: Apnea, bronchospasm, prolonged neuromuscular block

PHARMACOKINETICS

Onset 2 min, peak 3-5 min, duration 25-44 min, half-life 22-30 min

INTERACTIONS

Increase: neuromuscular blockade—aminoglycosides, clindamycin, lithium, local anesthetics, magnesium salts, colistin, colistimethate, procainamide, quiNIDine, tetracyclines, bacitracin, capreomycin, polymyxin B, vancomycin; amphotericin B, CISplatin, corticosteroids, loop/thiazide diuretics (if hypokalemia is present)
Decrease: neuromuscular blockade—carBAMazepine, phenytoin

NURSING CONSIDERATIONS

Assess:

Neuromuscular Function:

- Use nerve stimulator to monitor neuromuscular function; if no response, stop until response; not to be used for rapid-sequence endotracheal intubation

Electrolyte:

- Electrolytes and acid-base balance may be altered

Malignant hyperthermia: Assess for malignant hyperthermia; those with a family history of this condition should not receive this product or it should be used cautiously

Evaluate:

- Maintenance of neuromuscular blockade

Teach patient/family:

- Reason for product and expected results

⚠ HIGH ALERT

CISplatin (Rx)

(sis'pla-tin)

Func. class.: Antineoplastic alkylating agent

Chem. class.: Platinum complex

Do not confuse:
CISplatin/CARBOplatin

ACTION: Alkylates DNA, RNA; inhibits enzymes that allow for the synthesis of amino acids in proteins; activity not cell-cycle–phase specific

USES: Advanced bladder cancer; adjunct in metastatic testicular cancer; osteosarcoma; soft-tissue sarcomas; adjunct in metastatic ovarian cancer; head, neck cancer; esophagus, prostate, lung, cervical cancer; lymphoma
Unlabeled uses: Astrocytoma; breast, gastric, head, neck, hepatocellular, lung, penile cancer; carcinoid, desmoid tumor; Hodgkin's disease, malignant glioma, malignant melanoma, neuroblastoma, non-Hodgkin's lymphoma (NHL), osteogenic sarcoma

CONTRAINDICATIONS: Pregnancy (D), breastfeeding

Black Box Warning: Preexisting hearing impairment, bone marrow suppression, platinum compound hypersensitivity, renal disease/failure

Precautions: Geriatric patients, vaccination

DOSAGE AND ROUTES

Dosage protocols may vary

Metastatic testicular cancer
- **Adult: IV** 20 mg/m²/day × 5 days, repeat q3wk for 2 cycles or more, depending on response

Advanced bladder cancer
- **Adult: IV** 50-70 mg/m² q3-4wk

Metastatic ovarian cancer
- **Adult: IV** 100 mg/m² q4wk or 75-100 mg/m² q3wk with cyclophosphamide

Hodgkin's/non-Hodgkin's lymphoma (unlabeled)
- **Adult and child: IV INF** 100 mg/m² 24 hr continuous inf day 1 of 4-day regimen with cytarabine/dexamethasone q3-4wk

Gastric cancer (unlabeled)
- **Adult: IV** 75 mg/m² on day 1 with docetaxel 75 mg/m² and fluorouracil 750 mg/m² on days 1-5, q21days

Available forms: Inj 0.5 ♣, 1 mg/ml

Administer:

IV route
- Do not use aluminum equipment during any preparation or administration, will form precipitate; do not refrigerate unopened powder or solution; protect from sunlight
- Prepare in biologic cabinet using gown, gloves, mask; do not allow product to come in contact with skin; use soap and water if contact occurs; use cytotoxic handling procedures
- Hydrate patient with 0.9% NaCl over 8-12 hr before treatment
- EPINEPHrine, antihistamines, corticosteroids for hypersensitivity reaction
- Antiemetic 30-60 min before product and prn; allopurinol to maintain uric acid levels, alkalinization of urine; diuretic (furosemide 40 mg IV) or mannitol after INF

Intermittent IV INF route
- **Dilute** 10 mg/10 ml or 50 mg/50 ml sterile water for inj, withdraw prescribed dose; **dilute** ½ dose with 1000 ml D_5 0.2 NaCl, D_5 0.45 NaCl with 37.5 g mannitol; IV INF is **given** over 3-4 hr; use a 0.45-μm filter; total dose 2 L over 6-8 hr; check site for irritation, phlebitis

Continuous IV INF route
- **Give** over 24 hr × 5 days

Additive compatibilities: CARBOplatin, cyclophosphamide, floxuridine, hydrOXYzine, ifosfamide, leucovorin, mag-

nesium sulfate, mannitol, ondansetron, potassium chloride

Solution compatibilities: D_5/0.225% NaCl, D_5/0.45% NaCl, D_5/0.9% NaCl, D_5/0.45% NaCl with mannitol 1.875%, D_5/0.33% NaCl with KCl 20 mEq and mannitol 1.875%, 0.9% NaCl, 0.45% NaCl, 0.3% NaCl, 0.225% NaCl

Syringe compatibilities: Bleomycin, cyclophosphamide, doxapram, droperidol, fluorouracil, furosemide, heparin, leucovorin, methotrexate, metoclopramide, vinBLAStine, vinCRIStine

Y-site compatibilities: Acyclovir, alfentanil, allopurinol, amikacin, aminophylline, amiodarone, ampicillin, ampicillin-sulbactam, anidulafungin, atenolol, atracurium, azithromycin, aztreonam, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, carmustine, caspofungin, ceFAZolin, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, ceftAZidime, ceftizoxime, cefTRIAXone, cefuroxime, chlorproMAZINE, cimetidine, ciprofloxacin, cisatracurium, cladribine, clindamycin, codeine, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, DAUNOrubicin, dexamethasone, dexmedetomidine, dexrazoxane, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, docetaxel, DOPamine, doripenem, doxacurium, DOXOrubicin, DOXOrubicin liposomal, doxycycline, droperidol, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, ertapenem, erythromycin, esmolol, etoposide, famotidine, fenoldopam, fentaNYL, filgrastim, fluconazole, fludarabine, fluorouracil, foscarnet, fosphenytoin, furosemide, ganciclovir, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, haloperidol, heparin, hydrocortisone, HYDROmorphone, IDArubicin, ifosfamide, imipenem-cilastatin, inamrinone, indomethacin, irinotecan, isoproterenol, ketorolac, labetalol, leucovorin, levofloxacin, levorphanol, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, melphalan, meperidine, meropenem, methohexital, methotrexate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, midazolam, milrinone, minocycline, mitoMYcin, mitoXANtrone, mivacurium, nafcillin, naloxone, nesiritide, niCARdipine, nitroglycerin, nitroprusside, norepinephrine, octreotide, ofloxacin, ondansetron, oxaliplatin, PACLitaxel, palonosetron, pamidronate, pancuronium, PEMEtrexed, pentamidine, pentazocine, PENTobarbital, PHENobarbital, phenylephrine, phenytoin, piperacillin, polymyxin B, potassium chloride/phosphates, procainamide, prochlorperazine, promethazine, propofol, propranolol, quiNIDine, quinupristin-dalfopristin, ranitidine, remifentanil, riTUXimab, sargramostim, sodium acetate/bicarbonate/phosphates, succinylcholine, SUFentanil, sulfamethoxazole-trimethoprim, tacrolimus, teniposide, theophylline, thiopental, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, TNA, tobramycin, topotecan, trastuzumab, vancomycin, vasopressin, vecuronium, verapamil, vinBLAStine, vinCRIStine, vinorelbine, voriconazole, zidovudine, zoledronic acid

SIDE EFFECTS

CNS: Seizures, *peripheral neuropathy*
CV: Cardiac abnormalities
EENT: *Tinnitus, hearing loss, vestibular toxicity,* blurred vision, altered color perception
GI: *Severe nausea, vomiting, diarrhea, weight loss*
GU: Renal tubular damage, *renal insufficiency,* impotence, sterility, amenorrhea, gynecomastia, hyperuremia
HEMA: Thrombocytopenia, leukopenia, pancytopenia
INTEG: *Alopecia,* dermatitis
META: *Hypomagnesemia,* hypocalcemia, hypokalemia, hypophosphatemia
RESP: Fibrosis
SYST: Anaphylaxis

PHARMACOKINETICS

Absorption complete, metabolized in liver, excreted in urine, half-life 20 min

first phase, 48-70 min second phase, 24 hr terminal phase, accumulates in body tissues for several months, enters breast milk

INTERACTIONS

Increase: bleeding risk—aspirin, NSAIDs, alcohol
Increase: ototoxicity—bumetanide, ethacrynic acid, furosemide
Increase: myelosuppression—myelosuppressive agents, radiation
Increase: nephrotoxicity—aminoglycosides, loop diuretics, salicylates
Decrease: effects of phenytoin
Decrease: antibody response—live virus vaccines

Drug/Lab Test

Increase: uric acid, BUN, creatinine
Decrease: CCr, calcium, phosphate, potassium, magnesium
Positive: Coombs' test

NURSING CONSIDERATIONS

Assess:

Black Box Warning: **Bone marrow depression:** CBC, differential, platelet count weekly; withhold product if WBC is <4000 or platelet count is <100,000; notify prescriber of results

Black Box Warning: **Renal toxicity:** BUN, creatinine, serum uric acid, urine CCr before, electrolytes during therapy; dose should not be given if BUN <25 mg/dl; creatinine <1.5 mg/dl; I&O ratio; report fall in urine output of <30 ml/hr

⚠ **Anaphylaxis:** wheezing, tachycardia, facial swelling, fainting; discontinue product, report to prescriber; resuscitation equipment should be nearby, may occur within minutes; often EPINEPHrine, corticosteroids, antihistamines may alleviate symptoms

- Monitor temp q4hr; may indicate beginning infection
- Hepatic studies before, during therapy (bilirubin, AST, ALT, LDH) as needed

⚠ **Bleeding:** hematuria, guaiac, bruising, petechiae, mucosa or orifices q8hr; obtain prescription for viscous lidocaine (Xylocaine)

Black Box Warning: **Ototoxicity:** More common in genetic variants TPMT 3B and 3C in children, use audiometric testing baseline and before each dose

- Effects of alopecia on body image; discuss feelings about body changes

Perform/provide:

- Comprehensive oral hygiene
- All medications PO, if possible; avoid IM inj when platelets <100,000/mm^3
- **Hyperuricemia:** Increase fluid intake to 2-3 L/day to prevent urate deposits, calculi formation; promote elimination of product, usually occurs between 3-5 days after a dose, may use allopurinol

Evaluate:

- Therapeutic response: decreased tumor size, spread of malignancy

Teach patient/family:

- To report signs of infection: increased temp, sore throat, flulike symptoms
- To report signs of anemia: fatigue, headache, faintness, SOB, irritability
- To report bleeding, bruising, petechiae; to avoid use of razors, commercial mouthwash; to avoid aspirin, ibuprofen, NSAIDs, alcohol; may cause GI bleeding
- That impotence or amenorrhea can occur but is reversible after discontinuing treatment

Black Box Warning: **Ototoxicity:** To report loss of hearing, ringing or roaring in the ears

- To maintain adequate fluids; report decreased urine output, flank pain
- That hair may be lost during treatment; a wig or hairpiece may make patient feel better; new hair may be different in color, texture
- To report numbness, tingling in face or extremities; poor hearing; joint pain, swelling
- Not to receive vaccinations during treatment
- To use contraception during treatment and for 4 mo after (pregnancy D); product may cause infertility; to avoid breastfeeding

citalopram (Rx)

(sigh-tal'oh-pram)

Celexa

Func. class.: Antidepressant

Chem. class.: Selective serotonin reuptake inhibitor (SSRI)

Do not confuse:
CeleXA/CeleBREX/Cerebyx/Cerebra/Zyprexa

ACTION: Inhibits CNS neuron uptake of serotonin but not of norepinephrine; weak inhibitor of CYP450 enzyme system, thus making it more appealing than other products

USES: Major depressive disorder
Unlabeled uses: Premenstrual disorders, panic disorder, social phobia, impulsive aggression in children, obsessive-compulsive disorder in adolescents; treatment of psychotic symptoms in nondepressed demented patients; anxiety, hot flashes, menopause; adjunct in schizophrenia, PTSD

CONTRAINDICATIONS: Hypersensitivity
Precautions: Pregnancy (C), breastfeeding, geriatric patients, renal/hepatic disease, seizure disorder, hypersensitivity to escitalopram

Black Box Warning: Children, suicidal ideation

DOSAGE AND ROUTES

Depression
• **Adult: PO** 20 mg/day AM or PM, may increase if needed to 40 mg/day after 1 wk; maintenance: after 6-8 wk of initial treatment, continue for 24 wk (32 wk total), reevaluate long-term usefulness (max 40 mg/day)
Hepatic dose/geriatric
• **Adult: PO** 20 mg/day
Panic disorder (unlabeled)
• **Adult: PO** 20-40 mg/day
Premenstrual dysphoria/social phobia (unlabeled)
• **Adult: PO** 10-30 mg/day, used intermittently in premenstrual dysphoria
Available forms: Tabs 10, 20, 40 mg; oral sol 10 mg/5 ml
Administer:
• With food or milk for GI symptoms
• Crushed if patient is unable to swallow medication whole
• Dosages at bedtime if oversedation occurs during the day; may take entire dose at bedtime
• Do not give within 14 days of MAOIs

SIDE EFFECTS

CNS: *Headache, nervousness, insomnia, drowsiness, anxiety, tremor, dizziness, fatigue, sedation, poor concentration, abnormal dreams, agitation,* seizures, apathy, euphoria, hallucinations, delusions, psychosis, suicidal attempts, neuroleptic malignant-like syndrome reactions
CV: *Hot flashes, palpitations,* angina pectoris, hemorrhage, hypertension, tachycardia, 1st-degree AV block, bradycardia, MI, thrombophlebitis
EENT: Visual changes, ear/eye pain, photophobia, tinnitus
GI: *Nausea, diarrhea, dry mouth, anorexia, dyspepsia, constipation, cramps, vomiting, taste changes, flatulence, decreased appetite*
GU: *Dysmenorrhea, decreased libido, urinary frequency, UTI,* amenorrhea, cystitis, impotence, urine retention
INTEG: *Sweating, rash, pruritus,* acne, alopecia, urticaria
MS: *Pain,* arthritis, twitching
RESP: *Infection, pharyngitis, nasal congestion, sinus headache, sinusitis, cough, dyspnea, bronchitis,* asthma, hyperventilation, pneumonia
SYST: *Asthenia, viral infection, fever, allergy, chills;* hyponatremia (geriatric patients), serotonin syndrome

PHARMACOKINETICS

Metabolized in liver by CYP3A4, CYP2C19; excreted in urine; steady state 1 wk; peak 4 hr; half-life 35 hr

INTERACTIONS

⚠ Fatal reactions: do not use with MAOIs

⚠ **Increase:** QTc interval—dofetilide, halofantrine, probucol, pimoside, quinolones, ziprasidone; do not use together

Increase: effect of tricyclics; use cautiously

Increase: serotonin syndrome—serotonin receptor agonists, SSRIs, traMADol, lithium, MAOIs, traZODone, SNRIs (venlafaxine, DULoxetine)

Increase: bleeding risk—NSAIDs, salicylates, thrombolytics, anticoagulants, antiplatelets

Increase: CNS effects—barbiturates, sedative/hypnotics, other CNS depressants

Increase: citalopram levels—macrolides, azole antifungals

Increase: plasma levels of β-blockers

Decrease: citalopram levels—carBAMazepine, cloNIDine

Drug/Herb

⚠ **Increase:** serotonin syndrome—St. John's wort, SAM-e; fatal reaction may occur; do not use concurrently

Increase: CNS stimulation—yohimbe

Drug/Lab Test

Increase: serum bilirubin, blood glucose, alk phos

Decrease: VMA, 5-HIAA

False increase: urinary catecholamines

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Mental status: mood, sensorium, affect, suicidal tendencies, increase in psychiatric symptoms, depression, panic

⚠ Serotonin syndrome: increased heart rate, sweating, dilated pupils, tremors, twitching, hyperthermia, agitation

• B/P lying, standing, pulse q4hr; if systolic B/P drops 20 mm Hg, hold product, notify prescriber; take vital signs q4hr in patients with CV disease

• Weight weekly; appetite may decrease or increase with product

• **Torsades de pointes, QT prolongation:** is dose-dependent, ECG for flattening of T wave, bundle branch, AV block, dysrhythmias in cardiac patients

• Alcohol consumption; if alcohol is consumed, hold dose until AM

• Sexual dysfunction: erectile dysfunction, decreased libido

Perform/provide:

• Storage at room temp; do not freeze

• Assistance with ambulation during therapy, since drowsiness, dizziness occur

• Safety measures, primarily for geriatric patients

• Check to confirm PO medication swallowed

• Sugarless gum, hard candy, frequent sips of water for dry mouth

Evaluate:

• Therapeutic response: decreased depression

Teach patient/family:

• That therapeutic effect may take 4-6 wk, that patient may have increased anxiety 1st 5-7 days of therapy

• To use caution when driving, performing other activities that require alertness because of drowsiness, dizziness, blurred vision; to report signs, symptoms of bleeding

• To avoid alcohol, other CNS depressants

Black Box Warning: That suicidal ideas, behavior may occur in children or young adults

• To notify prescriber if pregnant, planning to become pregnant, or breastfeeding

⚠ About the effects of serotonin syndrome: nausea/vomiting, tremors; if symptoms occur, to discontinue immediately, notify prescriber

clarithromycin (Rx)

(klare-ith'row-my-sin)

Biaxin, Biaxin Filmtab, Biaxin XL

Func. class.: Antiinfective

Chem. class.: Macrolide

ACTION: Binds to 50S ribosomal subunits of susceptible bacteria and suppresses protein synthesis

USES: Mild to moderate infections of the upper and lower respiratory tract, uncomplicated skin and skin-structure infections caused by *Streptococcus pneumoniae, Mycoplasma pneumoniae, Legionella pneumophila, Moraxella catarrhalis, Neisseria gonorrhoeae, Corynebacterium diphtheriae, Listeria monocytogenes, Haemophilus influenzae, Streptococcus pyogenes, Staphylococcus aureus, Mycobacterium avium* complex (MAC); complex infection in AIDS patients; *Mycobacterium avium intracellulare, Helicobacter pylori* in combination with omeprazole, *H. parainfluenzae*

Unlabeled uses: Endocarditis prophylaxis, dyspepsia, gastric ulcer, Legionnaire's disease, pertussis, SARS

CONTRAINDICATIONS: Hypersensitivity to this product or macrolide antibiotics, torsades de pointes, QT prolongation

Precautions: Pregnancy (C), breastfeeding, geriatric patients, renal/hepatic disease

DOSAGE AND ROUTES

Acute exacerbation of chronic bronchitis

- **Adult: PO** 250-500 mg q12hr × 7-14 days or 1000 mg/day × 7 days (XL)

Pharyngitis/tonsillitis

- **Adult: PO** 250 mg q12hr × 10 days

Community-acquired pneumonia

- **Adult: PO** 250 mg q12hr × 7-14 days or 1000 mg/day × 7 days (XL)

MAC prophylaxis/treatment

- **Adult: PO** 500 mg bid; will require an additional antiinfective for active infection

***H. pylori* infection**

- **Adult: PO** 500 mg bid plus omeprazole 2 × 20 mg every AM (days 1-14), then omeprazole 20 mg every AM (days 15-28)

Acute maxillary sinusitis

- **Adult: PO** 500 mg q12hr × 14 days

Most infections

- **Child: PO** 7.5 mg/kg q12hr × 10 days, max 500 mg/dose for MAC

Renal dose

- **Adult and child: PO** CCr <30 ml/min, reduce dose by 50%, if used with ritonavir reduce by 75%

Legionnaire's disease/SARS/whooping cough/gastric ulcer/dyspepsia *(H. pylori)* (unlabeled)

- **Adult: PO** 500 mg q12hr; may be used in combination for some of these conditions

Endocarditis prophylaxis (unlabeled)

- **Adult: PO** 500 mg 1 hr before procedure

Available forms: Tabs 250, 500 mg; oral susp 125 mg/5 ml, 250 mg/5 ml; ext rel tab (XL) 500 mg

Administer:

- Do not break, crush, or chew tabs
- Adequate intake of fluids (2 L) during diarrhea episodes
- q12hr to maintain serum levels

SIDE EFFECTS

CV: Ventricular dysrhythmias, QT prolongation

GI: *Nausea, vomiting, diarrhea,* hepatotoxicity, *abdominal pain,* stomatitis, heartburn, anorexia, *abnormal taste,* pseudomembranous colitis

GU: Vaginitis, moniliasis

HEMA: Leukopenia, thrombocytopenia, increased INR

INTEG: Rash, urticaria, pruritus, Stevens-Johnson syndrome, toxic epidermal necrolysis

MISC: *Headache,* hearing loss

PHARMACOKINETICS

Peak 2-2.5 hr; duration 12 hr; half-life 3-4 hr; metabolized by liver; excreted in bile, feces; possible inhibition of P-glycoprotein

INTERACTIONS

Increase: dysrhythmias—cisapride, pimozide
Increase: levels, increase toxicity—ALPRAZolam, busPIRone, carBAMazepine, cycloSPORINE, digoxin, disopyramide, ergots, felodipine, fluconazole, omeprazole, tacrolimus, theophylline
Increase: oral anticoagulants effect—digoxin, theophylline, carBAMazepine
Increase: levels of HMG-CoA reductase inhibitors
Increase: action, risk for toxicity—all products metabolized by CYP3A enzyme system
Increase: effect of calcium channel blockers, midazolam, benzodiazepines, tacrolimus
Increase: QT prolongation—class IA, III antidysrhythmics
Increase or decrease action: zidovudine
Decrease: levels—rifampin, rifabutin
Drug/Lab Test
Increase: 17-OHCS/17-KS, AST, ALT, BUN, creatinine, LDH, total bilirubin
Decrease: folate assay, WBC

NURSING CONSIDERATIONS

Assess:
• **Infection:** wound characteristics, urine, stool, sputum, WBC, temp; C&S before product therapy; product may be given as soon as culture is taken; C&S may be repeated after treatment
• For ulcers: abdominal pain, bleeding in stools, emesis
• Renal, hepatic studies; report hematuria, oliguria
• Bowel pattern before, during treatment
• Respiratory status: rate, character, wheezing, tightness in chest; discontinue product
• Allergies before treatment, reaction to each medication
• **QT prolongation, ventricular dysrhythmias:** monitor ECG, cardiac status in those with underlying cardiac abnormalities
• **Serious skin reaction:** Stevens-Johnson syndrome, toxic epidermal necrolysis; product should be discontinued immediately
Perform/provide:
• Storage at room temp
Evaluate:
• Therapeutic response: C&S negative for infection
Teach patient/family:
• To take with full glass of water; may give with food to decrease GI symptoms
⚠ To report sore throat, fever, fatigue; may indicate superinfection
⚠ To notify prescriber of diarrhea, dark urine, pale stools, yellow discoloration of eyes or skin, severe abdominal pain
• To take at evenly spaced intervals; to complete dosage regimen
• To notify prescriber if pregnancy is suspected or planned

TREATMENT OF HYPERSENSITIVITY: Withdraw product, maintain airway, administer EPINEPHrine, aminophylline, O_2, IV corticosteroids

clevidipine (Rx)

(klev-id'i-peen)
Cleviprex
Func. class.: Calcium channel blocker (L-type)
Chem. class.: Dihydropyridine

ACTION: L-type calcium channels mediate the influx of calcium during depolarization in arterial smooth muscle; reduces mean arterial B/P by decreasing systemic vascular resistance

USES: Reduction of B/P when oral therapy not feasible

CONTRAINDICATIONS:

Hypersensitivity to this product, eggs, soya lecithin; defective lipid metabolism; severe aortic stenosis, pancreatitis

Precautions: Pregnancy (C), labor, breastfeeding, children <18 yr, heart failure, hyperlipidemia, chronic hypertension, pheochromocytoma

DOSAGE AND ROUTES

• **Adult: CONT IV** 1-2 mg/hr; dose may be doubled q90sec initially; as B/P reaches goal, adjust dose less frequently (q5-10min) with smaller increases in dose; most patients require 4-6 mg/hr, max 32 mg/hr; no more than 1000 ml should be infused per 24-hr period due to lipid load restrictions

Available forms: Single-dose vial 50, 100 ml (0.5 mg/ml); IV emulsion

Administer:

Intermittent IV INF route

• Do not give through same line as other medications, do not dilute

• Gently invert several times before use; do not use if discolored or if particulate matter is present

• Give through central or peripheral line at 1-2 mg/hr, use infusion device

SIDE EFFECTS

CNS: Headache

CV: MI, sinus tachycardia, syncope, reflex tachycardia, atrial fibrillation

GI: Nausea, vomiting

PHARMACOKINETICS

Onset 2-4 min; half-life initially 1 min, terminal 15 min; metabolized via esterases in blood, extravascular tissues; excreted in urine 63%-74%, feces 7%-22%; protein binding >99%

NURSING CONSIDERATIONS

Assess:

• Cardiac status: B/P, pulse, respiration, ECG; some patients have developed severe angina, acute MI after calcium channel blockers if obstructive CAD is severe; if not transitioned to other antihypertensive therapies after clevidipine inf, patients should be monitored ≥8 hr for rebound hypertension; monitor for rebound hypertension after product stoppage

Perform/provide:

• Storage of vials in refrigerator, do not freeze; leave vials in carton until use; product is photosensitive but protection from light during administration is not required

Evaluate:

• Therapeutic response: decreased B/P

Teach patient/family:

• To notify prescriber immediately if neurological symptoms, visual changes, or symptoms of CHF occur

• To continue follow-up for hypertension

• To notify prescriber if pregnancy is planned, suspected, or if breastfeeding

clindamycin HCl (Rx)
(klin-da-my'sin)
Cleocin HCl, Dalacin C ✤

clindamycin palmitate (Rx)
Cleocin Pediatric, Dalacin C Flavored Granules ✤

clindamycin phosphate (Rx)
Cleocin Phosphate, Dalacin C Phosphate Sterile Solution ✤

Func. class.: Antiinfective—miscellaneous

Chem. class.: Lincomycin derivative

ACTION:

Binds to 50S subunit of bacterial ribosomes, suppresses protein synthesis

USES:

Infections caused by staphylococci, streptococci, *Rickettsia, Fusobacterium, Actinomyces, Peptococcus, Bacteroides, Pneumocystis jiroveci*

Unlabeled uses: Acne rosacea, *Bacillus anthracis,* dental infections, folliculi-

tis, malaria, pemphigus, periodontitis, *Pneumocystis jiroveci* pneumonia (PCP), toxoplasmosis

CONTRAINDICATIONS: Hypersensitivity to this product or lincomycin, tartrazine dye; ulcerative colitis/enteritis

Black Box Warning: Pseudomembranous colitis

Precautions: Pregnancy (B), breastfeeding, geriatric patients, GI/renal/hepatic disease, asthma, allergy

Black Box Warning: Diarrhea

DOSAGE AND ROUTES

• **Adult: PO** 150-450 mg q6-8hr, max 1.8 g/day; **IM/IV** 1.2-2.7 g/day in 2-4 divided doses, max 4800 mg/day

• **Child >1 mo: PO** 8-25 mg/kg/day in divided doses q6-8hr; **IM/IV** 20-40 mg/kg/day in 3-4 equal divided doses q6-8hr

• **Neonate: IM/IV** 15-20 mg/kg/day divided doses q6-8hr

PID

• **Adult: IV** 900 mg q8hr plus gentamicin

Bacterial endocarditis prophylaxis (unlabeled)

• **Adult:** 600 mg 1 hr before procedure

***P. jiroveci pneumonia* (unlabeled)**

• **Adult: PO** 1200-1800 mg/day in divided doses with 15-30 mg primaquine/day × 21 days

Acne Vulgaris

• **Adult/adolescent:** Top gel, lotion, sol, apply a thin film to affected areas bid for up to 12 wk

• **Adult/adolescents/child ≥2 yr:** Top (foam), apply to affected areas daily, if no improvement in 8 wk, discontinue

Bacteria vaginosis nonpregnant

• **Adult/adolescent females:** Intravaginal 1 applicator full (100 mg clindamycin/5 g cream) at bedtime × 7 days (CDC)

Available forms: HCl: caps 75, 150, 300 mg; **palmitate:** oral sol 75 mg/5 ml; **phosphate:** inj 150, 300, 600 mg base/4 ml; 900 mg base/ml; inj inf in D_5 300 mg, 600 mg, 900 mg; top pledget/foam/gel/lotion/solution/1%; Vag cream 2%; Vag suppository 100 mg

Administer:

• In equal intervals around the clock to maintain blood levels

• Obtain C&S before use

• EPINEPHrine, suction, tracheostomy set, endotracheal intubation equipment on unit available

PO route

• Do not break, crush, chew caps

• Orally with at least 8 oz of water

Oral solution

• Do not refrigerate reconstituted product, store at room temperature ≤2 wk

• Reconstitute granules with most of 75 ml of water, shake well, add remaining water, shake well (75 mg/5 ml)

IM route

• IM deep inj; rotate sites; do not give >600 mg in single IM inj

Intermittent IV INF route

• By inf only; do not administer bolus dose; **dilute** 300-mg or 600-mg doses/50 ml of D_5W, NS; **give** over 10 or 20 min, respectively; 900-mg and 1200-mg doses/100 ml of compatible diluent and **give** over 30 or 40 min, respectively; final conc ≤12 mg/ml; if using ADD-Vantage vials, dilute containers with NS, D_5W, give over 10-60 min, rate max 30 mg/min, max 1.2 g/h

Rapid IV inj route

• Dilute as above, administer as rapid 1st dose only, then give at **cont inf** rate based on clindamycin levels

Syringe compatibilities: Amikacin, aztreonam, gentamicin, heparin

Y-site compatibilities: Acyclovir, alfentanil, amifostine, amikacin, aminocaproic acid, aminophylline, amiodarone, amphotericin B cholesteryl, amphotericin B lipid complex, amsacrine, anakinra, anidulafungin, ascorbic acid injection, atenolol, atracurium, atropine, aztreonam, benztropine, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, cefamandole, ceFAZolin, cefmetazole, cefonicid, cefo-

perazone, cefotaxime, cefoTEtan, cefOXitin, cefpirome, cefTAZidime, ceftizoxime, ceftobiprole, cefuroxime, cephalothin, cephapirin, chloramphenicol, cimetidine, cisatracurium, CISplatin, codeine, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, dexmedetomidine, digoxin, diltiazem, diphenhydrAMINE, DOCEtaxel, DOPamine, doxacurium, DOXOrubicin, DOXOrubicin liposomal, doxycycline, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, epoetin alfa, eptifibatide, esmolol, etoposide, famotidine, fenoldopam, fentaNYL, fludarabine, fluorouracil, folic acid, foscarnet, furosemide, gatifloxacin, gemcitabine, gemtuzumab, gentamicin, glycopyrrolate, granisetron, heparin, hydrocortisone, HYDROmorphone, ifosfamide, imipenem-cilastatin, indomethacin, insulin (regular), irinotecan, isoproterenol, ketorolac, levofloxacin, lidocaine, linezolid, LORazepam, LR, magnesium sulfate, mannitol, mechlorethamine, melphalan, meperidine, metaraminol, methicillin, methotrexate, methoxamine, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, mezlocillin, miconazole, milrinone, morphine, moxalactam, multiple vitamins injection, nafcillin, nalbuphine, naloxone, nesiritide, netilmicin, niCARdipine, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxacillin, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pamidronate, pancuronium, pantoprazole, PEMEtrexed, penicillin G potassium/sodium, pentazocine, perphenazine, PHENobarbital, phenylephrine, phytonadione, piperacillin, piperacillin-tazobactam, potassium chloride, procainamide, propofol, propranolol, protamine, pyridoxine, ranitidine, remifentanil, Ringer's, ritodrine, riTUXimab, rocuronium, sargramostim, sodium acetate/bicarbonate, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiamine, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, TNA, tobramycin, tolazoline, TPN, trimetaphan, urokinase, vancomycin, vasopressin, vecuronium, verapamil, vinCRIStine, vinorelbine, vitamin B complex/C, voriconazole, zidovudine, zoledronic acid

C

SIDE EFFECTS

GI: *Nausea, vomiting, abdominal pain, diarrhea,* pseudomembranous colitis, anorexia, weight loss, increased AST/ALT, bilirubin, alk phos; jaundice
GU: *Vaginitis,* urinary frequency
INTEG: Rash, urticaria, pruritus, erythema, pain, abscess at inj site
SYST: Stevens-Johnson syndrome, exfoliative dermatitis

PHARMACOKINETICS

PO: Peak 45 min, duration 6 hr
IM: Peak 3 hr (adult), 1 hr (child); duration 8-12 hr; half-life 2½ hr; metabolized in liver; excreted in urine, bile, feces as inactive metabolites; crosses placenta; excreted in breast milk

INTERACTIONS

• May block clindamycin effect: erythromycin, chloramphenicol
Increase: neuromuscular blockade—neuromuscular blockers
Decrease: absorption—kaolin
Drug/Lab Test
Increase: alk phos, bilirubin, CPK, AST, ALT

NURSING CONSIDERATIONS

Assess:
• **Infection:** C&S before product therapy; product may be given as soon as culture is taken
• VS, urine, stools, sputum
• Hepatic studies: AST, ALT if on long-term therapy
• B/P, pulse in patient receiving product parenterally

Black Box Warning: Pseudomembranous colitis: bowel pattern before, during treatment; if severe diarrhea occurs, product should be discontinued, may occur several wk after therapy is terminated

• Respiratory status: rate, character, wheezing, tightness in chest
• **Serious skin reactions:** Stevens-Johnson syndrome, exfoliative dermatitis

Evaluate:
• Therapeutic response: decreased temp, negative C&S

Teach patient/family:
• To take oral product with full glass of water; that antiperistaltic products may worsen diarrhea
• About all aspects of product therapy; to complete entire course of medication to ensure organism death (10-14 days); culture may be taken after medication course completed
⚠ To report sore throat, fever, fatigue; may indicate **superinfection**
• To take with food to reduce GI symptoms
• To notify nurse or prescriber of diarrhea with pus, mucous

TREATMENT OF HYPERSENSITIVITY:

• Withdraw product; maintain airway; administer EPINEPHrine, aminophylline, O_2, IV corticosteroids

clindamycin (topical, vaginal)

(klin-da-mye'sin)

Cleocin, Cleocin-T, Clindacin-P, Clindagel, ClindaMax, Clindasol ♣, Clinda-T ♣, Clindesse, Clindets, Dalacin ♣, Evoclin

Func. class.: topical anti-infective

Chem. class.: lincosamide derivative

ACTION: Antibacterial activity results from inhibition of protein synthesis; bacteriostatic

USES: For the treatment of acne vulgaris; treatment of bacterial vaginosis and anaerobic bacteria

CONTRAINDICATIONS: Hypersensitivity to this product or lincomycin, history of antibiotic-associated colitis or ulcerative colitis

Precautions: Breastfeeding, children younger than 12 yr

DOSAGE AND ROUTES

Acne vulgaris
• **Adult/adolescent: TOP** (gel, lotion, solution) Apply a thin film of 1% to affected areas bid
• **Adult/adolescent/child ≥12 yr: TOP (foam)** Apply 1% topical foam to affected areas once daily. If there is no improvement after 6-8 weeks, or if the condition worsens, discontinue treatment
• **TOP** (medicated pledgets) Use a pledget to apply a thin film to the affected area bid; more than one pledget may be used, but each pledget should be used only once and then discarded

Bacterial vaginosis and anaerobic bacteria

Nonpregnant adult/adolescent/postmenarchal females:
• **Intravaginal cream** One applicatorful (100 mg clindamycin/5 g cream) intravaginally, preferably at bedtime, for 3 or 7 consecutive days in nonpregnant women and for 7 consecutive days in pregnant women. Clindesse is administered as a single dose at any time of the day
• **Intravaginal ovules/suppositories** As an alternative to first-line therapies, the CDC recommends one ovule (100 mg clindamycin) inserted intravaginally at bedtime for 3 days

Available forms: Topical gel, foam, lotion, pledget, solution 1%; vaginal cream 2%, vaginal suppositories 100 mg

Administer:

Topical route:
• Improvement occurs after 6 wk but can require 8-12 wk
• Topical skin products are not for intravaginal therapy and are for external use only; do not use skin products near the eyes, nose, or mouth

• Wash hands before and after use. Wash affected area and gently pat dry

Cream/ointment/lotion:

• Shake well before use (Lotion). Apply a thin film to the cleansed affected area. Massage gently into affected areas

Foam formulations:

• Do not dispense foam directly onto hands or face; the warmth of the skin will cause the foam to melt. Instead, dispense desired amount directly into the cap or onto a cool surface. Make sure enough foam is dispensed to cover the affected area(s). If the can feels warm or the foam seems runny, run the can under cold water. To apply, pick up small amounts of the foam with the fingertips and gently massage into the affected areas until the foam disappears

Solution formulations:

• Shake well before use. Apply a thin film to the cleansed affected area. Massage gently into affected areas; if using a solution-soaked pledget, patient may use more than 1 pledget per application as needed to treat affected areas, but each pledget should be used only once and then discarded

Intravaginal route:

• Only use dosage formulations specified for intravaginal use. Intravaginal dosage forms are not for topical therapy; do not ingest

Suppository:

• Unwrap vaginal ovule (suppository) before insertion; use applicator(s) supplied by the manufacturer

Cream:

• Use applicator(s) supplied by the manufacturer

SIDE EFFECTS

GU: Colitis, diarrhea, overgrowth, vaginitis, vaginal moniliasis, UTI

INTEG: Redness, burning, dermatitis, rash, pruritus

INTERACTIONS

Decrease: clindamycin effect—erythromycin

Increase: effect of—neuromuscular blockers

Drug/Lab Test

Increase: LFTs

NURSING CONSIDERATIONS

C

Assess:

Allergic reaction: Assess for hypersensitivity, product may need to be discontinued

• Contact prescriber immediately if severe diarrhea, stomach cramps/pain, or bloody stools occur

Infection: Assess for number of lesions, severity in acne, itching in vaginosis

Evaluate:

• Decreased lesions in acne, infection in vaginosis

Teach patient/family:

Topical route:

• Improvement occurs after 6 wk but can require 8-12 wk

• Topical skin products are not for intravaginal therapy and are for external use only; do not use skin products near the eyes, nose, or mouth

• Wash hands before and after use. Wash affected area and gently pat dry

Cream/ointment/lotion:

• Shake well before use. **Lotion** Apply a thin film to the cleansed affected area. Massage gently into affected areas

Foam formulations:

• Do not dispense foam directly onto hands or face; the warmth of the skin will cause the foam to melt. Instead, dispense desired amount directly into the cap or onto a cool surface. Make sure enough foam is dispensed to cover the affected area(s). If the can feels warm or the foam seems runny, run the can under cold water. To apply, pick up small amounts of the foam with the fingertips and gently massage into the affected areas until the foam disappears

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more than one pledget per application as needed to treat affected areas, but each pledget should be used only once and then discarded

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• Only use dosage formulations specified for intravaginal use. Intravaginal dosage forms are not for topical therapy; do not ingest

Suppository:

• Unwrap vaginal ovule (suppository) before insertion; use applicator(s) supplied by the manufacturer

Cream:

• Use applicator(s) supplied by the manufacturer

clobetasol

(kloe-bay'ta-sol)

Clobex, Cormax, Olux, Olux-E, Temovate, Temovate-E

Func. class.: Corticosteroid, topical

ACTION: Crosses cell membrane to attach to receptors to decrease inflammation, itching

USES: Inflammation/itching in corticosteroid-responsive dermatoses on the skin/scalp

CONTRAINDICATIONS: Hypersensitivity, use of some preparations on face, axilla, groin; monotherapy for primary bacterial infections

Precautions: Pregnancy (C), breastfeeding, children

DOSAGE AND ROUTES

• **Adult: TOP** Apply to infected areas bid (shampoo: daily up to 4 times a week)

Available forms: Gel, lotion, ointment, cream, shampoo, solution, spray, foam 0.05%

Administer

Topical route

⚠ Do not use with occlusive dressings

⚠ Treatment should be limited to 2 wk

• **Cream/Ointment/Lotion:** Using gloves, apply sparingly in a thin film and rub gently into the cleansed, slightly moist affected area

• **Gel:** Using gloves, apply sparingly in a thin film and rub gently into the cleansed, slightly moist affected area

• **Scalp foam:** Invert can and dispense a small amount of foam onto a saucer or other cool surface. Do not dispense directly onto hands. Pick up small amounts of foam with fingers and gently massage into affected area until foam disappears. Repeat until entire affected scalp area is treated

• **Shampoo:** Apply onto dry scalp in thin film, leave lather on scalp for 15 min, rinse off

SIDE EFFECTS

INTEG: Burning, folliculitis, pruritus, dermatitis, irritation, erythema, hypertrichosis, acne

MISC: Hyperglycemia

NURSING CONSIDERATIONS

Assess:

• Skin reactions: burning, pruritus, folliculitis, dermatitis

Evaluate:

• Decreasing itching, inflammation on the skin, scalp

Teach patient/family:

Topical route

⚠ Do not use with occlusive dressings

⚠ Treatment should be limited to 2 wk

• **Cream/Ointment/Lotion:** To apply sparingly in a thin film and rub gently into the cleansed, affected area

• **Gel:** To apply sparingly in a thin film and rub gently into the cleansed, slightly moist affected area

• **Scalp foam:** To invert can and dispense a small amount of foam onto a saucer or other cool surface. Do not dispense directly onto hands. Pick up

small amounts of foam with fingers and gently massage into affected area until foam disappears. Repeat until entire affected scalp area is treated

clomiPHENE (Rx)

(kloe'mi-feen)

Clomid, Serophene

Func. class.: Ovulation stimulant

Chem. class.: Nonsteroidal antiestrogenic

Do not confuse:
clomiPHENE/clomiPRAMINE
Serophen/Sarafem

ACTION: Increases LH, FSH release from the pituitary, which increases the maturation of the ovarian follicle, ovulation, and the development of the corpus luteum

USES: Female infertility (ovulatory failure)
Unlabeled uses: Oligospermia

CONTRAINDICATIONS: Pregnancy (X), hypersensitivity, hepatic disease, undiagnosed uterine bleeding, uncontrolled thyroid or adrenal dysfunction, intracranial lesion, ovarian cysts, endometrial carcinoma
Precautions: Hypertension, depression, seizures, diabetes mellitus, abnormal ovarian enlargement, ovarian hyperstimulation

DOSAGE AND ROUTES

• **Adult: PO** 50 mg/day × 5 days or 50 mg/day beginning on day 5 of menstrual cycle, may increase to 100 mg daily × 5 days with next cycle; may be repeated until conception occurs or max 6 cycles of therapy
Oligospermia (unlabeled)
• **Adult (men): PO** 25 mg/day × 25 days then 5 days off cycle each mo
Available forms: Tabs 50 mg

Administer:
• After discontinuing estrogen therapy
• At same time daily to maintain product level, without regard to food
• Avoid heat, moisture, light, store at room temperature

SIDE EFFECTS

CNS: *Headache, depression,* restlessness, anxiety, nervousness, fatigue, insomnia, dizziness, flushing
CV: Vasomotor flushing, phlebitis, deep venous thrombosis
EENT: Blurred vision, diplopia, photophobia
GI: *Nausea, vomiting, constipation,* abdominal pain, bloating, hepatitis
GU: Polyuria, urinary frequency, birth defects, spontaneous abortions, multiple ovulation, breast pain, oliguria, abnormal uterine bleeding, ovarian cyst, hypertrophy of ovary
INTEG: *Rash, dermatitis,* urticaria, alopecia

PHARMACOKINETICS

Metabolized in liver, excreted in feces

INTERACTIONS

Drug/Herb
Decrease: clomiPHENE effect—DHEA, black cohosh, chaste tree fruit
Drug/Food
Decrease: clomiPHENE effect—soy
Drug/Lab Test
Increase: LFTs

NURSING CONSIDERATIONS

Assess:
• LFTs before therapy: AST, ALT, alk phos
• Serum progesterone, urinary excretion of pregnanediol to identify occurrence of ovulation
• Ovarian size, cervical condition by pelvic examination
• Rule out endometrial carcinoma in women >35 yr by endometrial biopsy
Evaluate:
• Therapeutic response: fertility

Teach patient/family:
- That multiple births are common
- To notify prescriber immediately if low abdominal pain occurs; may indicate ovarian cyst, cyst rupture
- To notify prescriber of photophobia, blurred vision, diplopia, abnormal bleeding
- That, if dose is missed, to double it next time; if more than one dose is missed, to call prescriber
- That response usually occurs 4-10 days after last day of treatment
- About the method for taking, recording basal body temp to determine whether ovulation has occurred
- If ovulation can be determined (there is a slight decrease in temp then a sharp increase with ovulation), to attempt coitus 3 days before and every other day until after ovulation
- If pregnancy is suspected, to notify prescriber immediately (X)

clomiPRAMINE (Rx)

(kloe-mip'ra-meen)

Anafranil

Func. class.: Antidepressant, tricyclic

Chem. class.: Tertiary amine

Do not confuse:
clomiPRAMINE/clomiPHENE/chlorproMAZINE/desipramine/Norpramin

ACTION: Potentiates serotonin and norepinephrine; moderate anticholinergic effect

USES: Obsessive-compulsive disorder
Unlabeled uses: Panic disorder, autism, depression, premature ejaculation, dysphoria, phobias, anxiety, agoraphobia

CONTRAINDICATIONS: Hypersensitivity, immediate post-MI
Precautions: Pregnancy (C), breastfeeding, geriatric patients, seizures, cardiac disease, glaucoma, prostatic hypertrophy, urinary retention

Black Box Warning: Children, suicidal ideation

DOSAGE AND ROUTES

Obsessive-compulsive disorder
- **Adult: PO** 25 mg at bedtime, increase gradually over 4 wk to 75-250 mg/day in divided doses
- **Child 10-18 yr: PO** 25 mg/day gradually increase over 2 wk; max 3 mg/kg/day or 200 mg/day, whichever is smaller

Autism (unlabeled)
- **Adult: PO** 25 mg/day, may increase to 75-100 mg/day, max 250 mg/day
- **Child: PO** 25 mg/day, may increase if needed

Premature ejaculation (unlabeled)
- **Adult: PO** 25-50 mg/day

Depression (unlabeled)
- **Adult: PO** 25 mg at bedtime and increase gradually over 4 wk to 75-250 mg/day in divided doses
- **Child 10-18 yr: PO** 25-50 mg/day gradually increased; max 3 mg/kg/day or 200 mg/day, whichever is smaller

Available forms: Caps 25, 50, 75 mg

Administer:
- Do not break, crush, or chew caps
- Increased fluids, bulk in diet for constipation, especially for geriatric patients
- Without regard to food, during initial dosing and titration give with meals
- After titration, may be given as a single dose at bedtime to reduce daytime sedation

SIDE EFFECTS

CNS: *Dizziness, tremors, mania,* seizures, aggressiveness, EPS, drowsiness, headache, neuroleptic malignant syndrome, insomnia, agitation
CV: Hypotension, tachycardia, cardiac arrest
EENT: Blurred vision
ENDO: Galactorrhea, hyperprolactinemia
GI: *Constipation, dry mouth, nausea, dyspepsia,* weight gain, hepatic toxicity
GU: *Delayed ejaculation, anorgasmia,* urinary retention, decreased libido
HEMA: Agranulocytosis, neutropenia, pancytopenia

INTEG: Diaphoresis, photosensitivity
META: Hyponatremia
SYST: Suicide in children, adolescents

PHARMACOKINETICS

Onset ≥2 wk (depression), 4-10 wk (OCD); peak 2-6 hr; extensively bound to tissue and plasma proteins; demethylated in liver; active metabolites excreted in urine (50%-60%), feces (24%-32%); half-life 20-30 hr; steady state 1-2 wk

INTERACTIONS

Increase: hypertensive crisis, seizures, hypertensive episode—MAOIs
Increase: Serotonin syndrome-SSRIs, SNRIs serotonin syndrome, linezolid, methylene blue IV
Increase: clomiPRAMINE levels—cimetidine, FLUoxetine, fluvoxaMINE, sertraline; do not use together
Increase: hypertensive effect—cloNIDine, EPINEPHrine, norepinephrine
Increase: clomiPRAMINE level—CYP1A2, CYP2D6
Increase: CNS depression—alcohol, CNS depressants, general anesthetics
Increase: QT prolongation—other tricyclics, phenothiazines, quinolones
Decrease: effect of cloNIDine, levodopa, skeletal muscle relaxants, haloperidol, opiates
Decrease: clomiPRAMINE levels—barbiturates, carBAMazepine, phenytoin

Drug/Herb

Increase: serotonin syndrome—St. John's wort; do not use concurrently
Increase: CNS depression—hops, kava, valerian

Drug/Lab Test

Increase: prolactin, TBG, AST, ALT, blood glucose
Decrease: serum thyroid hormone (T_3, T_4)

NURSING CONSIDERATIONS

Assess:

• B/P lying, standing; pulse q4hr; if systolic B/P drops 20 mm Hg, withhold product, notify prescriber; take VS q4hr in patients with CV disease
• **Serotonin syndrome:** hyperpyrexia, rigidity, irregular pulse, diaphoresis
• **ECG** for flattening of T wave, QTc prolongation, bundle branch block, AV block, dysrhythmias in cardiac patients, may lead to cardiac collapse
• Blood studies: CBC, leukocytes, differential, cardiac enzymes if patient is receiving long-term therapy and signs of blood dyscrasias
• Hepatic studies: AST, ALT, bilirubin

Black Box Warning: Mental status: mood, sensorium, affect, suicidal tendencies; increase in psychiatric symptoms: depression, panic, frequency of obsessive-compulsive behaviors; watch closely for evidence of suicidal thoughts in children, adolescents; seizure disorders

• Urinary retention, constipation; constipation more likely in children
• **Withdrawal symptoms:** headache, nausea, vomiting, muscle pain, weakness; not usual unless product discontinued abruptly
• Alcohol consumption; if alcohol consumed, withhold dose until AM

Perform/provide:

• Storage in tight container at room temp; do not freeze
• Assistance with ambulation during beginning therapy, since drowsiness, dizziness occurs
• Gum, hard candy, or frequent sips of water for dry mouth

Evaluate:

• Therapeutic response: decreased anxiety, depression

Teach patient/family:

• That the effects may take 4-6 wk to appear
• About risk for seizures
• To use caution when driving, performing other activities that require alertness because drowsiness, dizziness, blurred vision may occur
• To avoid alcohol, other CNS depressants
• Not to discontinue medication quickly

after long-term use because this may cause nausea, headache, malaise

Black Box Warning: That suicidal thoughts/behaviors may occur in children, young adults, report immediately

- To wear sunscreen, protective clothing to prevent photosensitivity
- To notify prescriber if pregnancy is planned, suspected
- That men may experience a high incidence of sexual dysfunction
- **Serotonin syndrome:** report immediately sweating, diarrhea, twitching
- **Abrupt discontinuation:** do not stop abruptly

TREATMENT OF OVERDOSE:

ECG monitoring; induce emesis; lavage, activated charcoal; anticonvulsant; diazepam IV

clonazePAM (Rx)

(kloe-na'zi-pam)

Klonopin

Func. class.: Anticonvulsant

Chem. class.: Benzodiazepine derivative

Controlled Substance Schedule IV

Do not confuse:
clonazePAM/LORazepam/clorazepate/cloNIDine
KlonoPIN/cloNIDine

ACTION:

Inhibits spike, wave formation during absence seizures (petit mal); decreases amplitude, frequency, duration, spread of discharge during minor motor seizures

USES:

Absence, atypical absence, akinetic, myoclonic seizures; Lennox-Gastaut syndrome, panic disorder
Unlabeled uses: Anxiety, insomnia, nystagmus, restless leg syndrome

CONTRAINDICATIONS:

Pregnancy (D), hypersensitivity to benzodiazepines, acute closed-angle glaucoma, psychosis, severe hepatic disease
Precautions: Breastfeeding, geriatric patients, open-angle glaucoma, chronic respiratory disease, renal/hepatic disease

DOSAGE AND ROUTES

Lennox-Gastaut syndrome/atypicals absence seizures/akinetic and myclonic seizures

- **Adult: PO** up to 1.5 mg/day in 3 divided doses; may be increased 0.5-1 mg q3days until desired response, max 20 mg/day
- **Geriatric: PO** 0.25 daily-bid initially, increase by 0.25/day q7-14days as needed
- **Child <10 yr or <30 kg: PO** 0.01-0.03 mg/kg/day in divided doses q8hr, max 0.05 mg/kg/day; may be increased 0.25-0.5 mg q3days until desired response, max 0.1-0.2 mg/kg/day

Panic disorder

- **Adult: PO** 0.25 mg bid increase to 1 m daily after 3 days, max 4 mg/day

Restless leg syndrome (RLS) (unlabeled)

- **Adult: PO** 0.5 mg tid or 0.5 mg in the evening and 30 min before bedtime

Insomnia/anxiety (unlabeled)

- **Adult: PO** 0.125-0.25 mg at bedtime, titrate up q3-4days as needed

Available forms: Tabs 0.5, 1, 2 mg; orally disintegrating tabs 0.125, 0.25, 0.5, 1, 2 mg

Administer:

PO route

- With food, milk for GI symptoms
- **Orally disintegrating tablets:** open pouch by peeling back foil on blister pack (do not push tab through foil), place on tongue, allow to dissolve; may be swallowed with/without water
- Store at room temperature

SIDE EFFECTS

CNS: *Drowsiness,* dizziness, confusion, behavioral changes, tremors, insomnia, headache, suicidal tendencies, slurred speech, anterograde amnesia

CV: Palpitations, bradycardia, tachycardia
EENT: *Increased salivation, nystagmus, diplopia,* abnormal eye movements
GI: *Nausea, constipation,* polyphagia, anorexia, xerostomia, diarrhea, gastritis, sore gums
GU: Dysuria, enuresis, nocturia, retention, libido changes
HEMA: Thrombocytopenia, leukocytosis, eosinophilia
INTEG: Rash, alopecia, hirsutism
RESP: Respiratory depression, dyspnea, congestion

PHARMACOKINETICS

PO: Peak 1-2 hr, metabolized by liver, excreted in urine, half-life 18-50 hr, duration 6-12 hr, protein binding 85%

INTERACTIONS

Increase: clonazePAM effects—CYP3A4 inhibitors (azoles, cimetidine, clarithromycin, diltiazem, erythromycin, FLUoxetine), oral contraceptives
Increase: CNS depression—alcohol, barbiturates, opiates, antidepressants, other anticonvulsants, general anesthetics, hypnotics, sedatives
Decrease: clonazePAM effect—CYP3A4 inducers (carBAMazepine, PHENobarbital, phenytoin)
Drug/Herb
Increase: CNS depression—kava, chamomile, valerian
Increase: clonazePAM effect—ginkgo, melatonin
Decrease: clonazePAM effect—ginseng, St. John's wort
Drug/Lab Test
Increase: AST, alk phos, bilirubin
Decrease: Platelets, WBC

NURSING CONSIDERATIONS

Assess:
• **Seizures:** duration, type, intensity, with/without aura
• Blood studies: RBC, Hct, Hgb, reticulocyte counts every wk for 4 wk then monthly
• Hepatic studies: ALT, AST, bilirubin, creatinine
• **Abrupt discontinuation:** Do not discontinue abruptly, seizures may increase
• Signs of physical withdrawal if medication suddenly discontinued
⚠ **Mental status:** mood, sensorium, affect, oversedation, behavioral changes, **suicidal thoughts/behaviors;** if mental status changes, notify prescriber
• Eye problems: need for ophthalmic exam before, during, after treatment (slit lamp, funduscopy, tonometry)
• Allergic reaction: red, raised rash; product should be discontinued
⚠ **Blood dyscrasias:** fever, sore throat, bruising, rash, jaundice
• **Toxicity:** bone marrow depression, nausea, vomiting, ataxia, diplopia, CV collapse; drug levels during initial treatment (therapeutic 20-80 ng/ml)
Perform/provide:
• Assistance with ambulation during early part of treatment; dizziness occurs, especially among geriatric patients
Evaluate:
• Therapeutic response: decreased seizure activity
Teach patient/family:
• To carry emergency ID bracelet stating name, products taken, condition; prescriber's name, phone number
• To avoid driving, other activities that require alertness
• To avoid alcohol, other CNS depressants; increased sedation may occur
• Not to discontinue medication quickly after long-term use; to taper off over several wk
• To notify prescriber of yellowing of skin/eyes, clay-colored stools, bleeding, fever, extreme fatigue, sore throat, suicidal thoughts/behaviors
• To notify prescriber immediately if suicidal thoughts, behaviors occur

TREATMENT OF OVERDOSE:

Lavage, activated charcoal, flumazenil, monitor electrolytes, VS, administer vasopressors

cloNIDine (Rx)

(klon'i-deen)

Catapres, Catapres-TTS, Duraclon, Kapvay, Nexiclon

Func. class.: Antihypertensive

Chem. class.: Central α-adrenergic agonist

Do not confuse:
cloNIDine/KlonoPIN/clonazePAM
Catapres/Cataflam/Catarase

ACTION: Inhibits sympathetic vasomotor center in CNS, which reduces impulses in sympathetic nervous system; blood pressure, pulse rate, cardiac output decrease, prevents pain signal transmission in CNS by α-adrenergic receptor stimulation of the spinal cord

USES: Mild to moderate hypertension, used alone or in combination; severe pain in cancer patients (epidural)
Unlabeled uses: Opioid withdrawal, prevention of vascular headaches, treatment of menopausal symptoms, dysmenorrhea, attention-deficit/hyperactivity disorder (ADHD), autism, cycloSPORINE nephrotoxicity prophylaxis, diabetic neuropathy, ethanol withdrawal, Tourette's syndrome, hypertensive emergency

CONTRAINDICATIONS: Hypersensitivity; (epidural) bleeding disorders, anticoagulants
Precautions: Pregnancy (C), breastfeeding, children <12 yr (transdermal), geriatric patients, noncompliant patients, MI (recent), diabetes mellitus, chronic renal failure, Raynaud's disease, thyroid disease, depression, COPD, asthma, pheochromocytoma
Black Box Warning: Labor

DOSAGE AND ROUTES

Hypertension
- **Adult: PO/TRANSDERMAL** 0.1 mg bid then increase by 0.1-0.2 mg/day at weekly intervals until desired response; range 0.2-0.6 mg/day in divided doses
- **Geriatric: PO** 0.1 mg at bedtime, may increase gradually
- **Child: PO** 5-10 mcg/kg/day in divided doses q8-12hr, max 0.9 mg/day

Severe pain
- **Adult: CONT EPIDURAL INF** 30 mcg/hr
- **Child: CONT EPIDURAL INF** 0.5 mcg/kg/hr then titrate to response

Opioid withdrawal (unlabeled)
- **Adult: PO** 0.3-1.2 mg/day; may decrease by 50% × 3 days then decrease by 0.1-0.2 mg/day or discontinue

ADHD
- **Adolescent/child ≥6 yr: PO** 0.05 mg/kg/day in 3-4 divided doses × 8 wk, max 0.4 mg/day (unlabeled); ext rel 0.1 mg at bedtime, increase dose by 0.1 mg/day up to 0.4 mg/day

Menopausal symptoms (unlabeled)
- **Adult: TRANSDERMAL** 0.1-mg patch q1wk; **PO** 0.05-0.4 mg/day

Tourette's syndrome (unlabeled)
- **Adult: PO** 0.15-0.2 mg/day

Hypertensive emergency (unlabeled)
- **Adult: PO** 0.1-0.2 mg q1hr to a total of 0.6 mg

Available forms: Tabs 0.025 ♣, 0.1, 0.2, 0.3 mg; transdermal 2.5, 5, 7.5 mg delivering 0.1, 0.2, 0.3 mg/24 hr, respectively; inj 100, 500 mcg/ml; ext rel tab 0.1 mg (Kapvay), 0.17 mg (Nexiclon)

Administer:
- Store patches in cool environment, tablets in tight container

PO route
- Give last dose at bedtime
- Do not crush, cut, chew, or break ext rel tabs

Transdermal route
- Once weekly; apply to site without hair; best absorption over chest or upper arm; rotate sites with each application; clean site before application; apply firmly, especially around edges

Epidural route
- Used for severe cancer pain
- May be used with opiates

* Use only if familiar with epidural inf devices

SIDE EFFECTS

CNS: *Drowsiness, sedation, headache, fatigue,* nightmares, insomnia, mental changes, anxiety, depression, hallucinations, delirium
CV: *Orthostatic hypotension, palpitations,* CHF, ECG abnormalities, sinus tachycardia
EENT: Taste change, parotid pain
ENDO: Hyperglycemia
GI: *Nausea, vomiting, malaise,* constipation, *dry mouth*
GU: Impotence, dysuria, nocturia, gynecomastia
INTEG: *Rash,* alopecia, facial pallor, pruritus, hives, edema, burning papules, excoriation (transdermal patches)
MISC: Withdrawal symptoms
MS: Muscle, joint pain; leg cramps

PHARMACOKINETICS

Absorbed well
PO: Onset ½ to 1 hr, peak 2-4 hr, duration 8-12 hr, half-life 6-12 hr
TRANSDERMAL: Onset 3 days; duration 1 wk; metabolized by liver (metabolites); excreted in urine (30% unchanged, inactive metabolites), feces; crosses blood-brain barrier; excreted in breast milk

INTERACTIONS

* AV block: verapamil
⚠ Life-threatening elevations of B/P: tricyclics, β-blockers
Increase: CNS depression—opiates, sedatives, hypnotics, anesthetics, alcohol
Increase: hypotensive effects—diuretics, other antihypertensive nitrates
Decrease: hypotensive effects—tricyclics, MAOIs, appetite suppressants, amphetamines, prazosin, antipsychotics
Decrease: effect of levodopa
Drug/Herb
Increase: antihypertensive effect—hawthorn
Decrease: antihypertensive effect—ephedra, ginseng

Drug/Lab Test
Increase: blood glucose
Decrease: VMA, urinary catecholamines, aldosterone

NURSING CONSIDERATIONS

C

Assess:
• **Hypertension:** B/P, pulse; report significant changes
• **Opiate withdrawal (unlabeled):** fever, diarrhea, nausea, vomiting, cramps, insomnia, shivering, dilated pupils
• **Cancer pain:** location, intensity, character; alleviating, aggravating factors at baseline and frequently
• Edema in feet, legs daily; monitor I&O; check for falling output
• **Allergic reaction:** rash, fever, pruritus, urticaria; product should be discontinued if antihistamines fail to help
• **CHF:** edema, dyspnea, wet crackles, B/P, more common in geriatric patients
• Renal symptoms: polyuria, oliguria, frequency
Evaluate:
• Therapeutic response: decrease in B/P with hypertension, decrease in withdrawal symptoms (opioid), decrease in pain
Teach patient/family:
• To avoid hazardous activities, since product may cause drowsiness
• To notify all health care providers of medication use
• Not to discontinue product abruptly or **withdrawal symptoms** may occur: anxiety, increased B/P, headache, insomnia, increased pulse, tremors, nausea, sweating; to comply with dosage schedule even if feeling better
• Not to use OTC (cough, cold, or allergy) products unless directed by prescriber
• To rise slowly to sitting or standing position to minimize orthostatic hypotension, especially among geriatric patients
• To notify prescriber of mouth sores, sore throat, fever, swelling of hands or feet, irregular heartbeat, chest pain, signs of **angioedema**

• About excessive perspiration, dehydration, vomiting; diarrhea may lead to fall in B/P; consult prescriber if these occur; that product may cause dizziness, fainting; that lightheadedness may occur during first few days of therapy
• That product may cause dry mouth; to use hard candy, saliva product, sugarless gum, or frequent rinsing of mouth
• That compliance is necessary; not to skip or stop product unless directed by prescriber; tolerance may develop with long-term use
• **Transdermal:** How to use patch; that patch comes in two parts: product patch and overlay to keep patch in place; not to trim or cut patch; that response may take 2-3 days if product is given transdermally; on administration of patch, if switching from tabs to patch, to taper tabs to avoid withdrawal

TREATMENT OF OVERDOSE:
Supportive treatment; administer tolazoline, atropine, DOPamine prn

clopidogrel (Rx)
(klo-pid'oh-grel)
Plavix
Func. class.: Platelet aggregation inhibitor
Chem. class.: Thienopyridine derivative

Do not confuse:
Plavix/Paxil/Elavil

ACTION:
Inhibits ADP-induced platelet aggregation

USES:
Reducing the risk of stroke, MI, vascular death, peripheral arterial disease in high-risk patients, acute coronary syndrome, transient ischemic attack (TIA), unstable angina
Unlabeled uses: Cardiac surgery (infant and child), Kawasaki disease

CONTRAINDICATIONS:
Hypersensitivity, active bleeding
Precautions: Pregnancy (B), breastfeeding, children, previous hepatic disease, increased bleeding risk, neutropenia, agranulocytosis, renal disease, Asian/Black/Caucasian patients
Black Box Warning: CYP2C19 allele (poor metabolizers)

DOSAGE AND ROUTES
Recent MI, stroke, peripheral arterial disease
• **Adult: PO** 75 mg/day with/without aspirin
Acute coronary syndrome
• **Adult: PO** loading dose 300 mg then 75 mg/day with aspirin
Cardiac surgery/other cardiac conditions (unlabeled)
• **Child ≤2 yr, infant, neonate: PO** 0.2 mg/kg/day for platelet inhibition
Available forms: Tabs 75, 300 mg
Administer:
• Without regard to food
• Should be discontinued 5 days before elective surgery if an antiplatelet action is not desired

SIDE EFFECTS
CNS: Headache, dizziness, depression, syncope, hypesthesia, neuralgia
CV: Edema, hypertension, chest pain
GI: Nausea, vomiting, diarrhea, constipation, GI discomfort, GI bleeding, pancreatitis, hepatic failure
GU: Glomerulonephritis
HEMA: Epistaxis, purpura, bleeding, neutropenia, aplastic anemia, agranulocytosis, thrombotic thrombocytopenic purpura
INTEG: Rash, pruritus, anaphylaxis
MISC: UTI, hypercholesterolemia, chest pain, fatigue, intracranial hemorrhage, toxic epidermal necrolysis, Stevens-Johnson syndrome, flulike syndrome
MS: Arthralgia, back pain
RESP: Upper respiratory tract infection, dyspnea, rhinitis, bronchitis, cough, bronchospasm

PHARMACOKINETICS

Rapidly absorbed; peak 1-3 hr; metabolized by liver (CYP3A4); excreted in urine, feces; half-life 8 hr; plasma protein binding 95%; effect on platelets after 5-7 days

INTERACTIONS

Black Box Warning: Avoid use with CYP2C19 inhibitors (omeprazole, esomeprazole)

Increase: bleeding risk—anticoagulants, aspirin, NSAIDs, abciximab, eptifibatide, tirofiban, thrombolytics, ticlopidine, SSRIs, treprostinil, rifampin

Increase: action of some NSAIDs, phenytoin, TOLBUTamide, tamoxifen, torsemide, fluvastatin, warfarin

Decrease: clopidogrel effect—proton pump inhibitor (PPIs)

Decrease: CYP3A4 inhibitors/substrates—atorvastatin, simvastatin, cerivastatin

Drug/Herb

Increase: clopidogrel effect—feverfew, fish oil, omega-3 fatty acid, garlic, ginger, ginkgo biloba, green tea, horse chestnut

Decrease: clopidogrel effect—bilberry, saw palmetto

Drug/Lab Test

Increase: AST, ALT, bilirubin, uric acid, total cholesterol, nonprotein nitrogen (NPN)

NURSING CONSIDERATIONS

Assess:

⚠ **Thrombotic/thrombocytic purpura,** fever, thrombocytopenia, neurolytic anemia

Black Box Warning: CYP2C19 Allele (poor metabolizers): Consider using another antiplatelet product, higher CV reaction occurs after acute coronary syndrome or PCI, tests are available to determine CYP2C19 allele

- Symptoms of stroke, MI during treatment
- Hepatic studies: AST, ALT, bilirubin, creatinine (long-term therapy)
- Blood studies: CBC, differential, Hct, Hgb, PT, cholesterol (long-term therapy)

Evaluate:

- Therapeutic response: absence of stroke, MI

Teach patient/family:

- That blood work will be necessary during treatment
- To report any unusual bruising, bleeding to prescriber; that it may take longer to stop bleeding
- To take without regard to food
- To report diarrhea, skin rashes, subcutaneous bleeding, chills, fever, sore throat
- To tell all health care providers that clopidogrel is being used; may be held for 5 days before surgery

clotrimazole (topical, vaginal, oral)

(kloe-trim'a-zole)

Cruex, Gyne-Lotrimin, Lotrimin, Lotrimin AF, MyCelex, MyCelex-7, Trivagizole 3, Desenex

Func. class.: Topical antifungal

Chem. class.: Imidazole derivative

Do not confuse: clotrimazole/miconazole/clobetasol

ACTION: Antifungal activity results from altering cell wall permeability

USES: Vulvovaginal, oropharyngeal candidiasis; topical fungal infections

CONTRAINDICATIONS: Hypersensitivity, ophthalmic use

Precautions: Hepatic impairment (oral)

DOSAGE AND ROUTES

Tinea corporis, cruris, pedis, versicolor; candidiasis

- **Adult/child ≥2 yr:** Apply to affected area and rub into area AM/PM × 2-4 wk

Vulvovaginal candidiasis

- **Adult/child ≥12 yr: Vag cream** 1 applicator at bedtime × 3 days (2%) or 7 days (1%)

Canada only

Oropharyngeal candidiasis

• **Adult/child ≥3 yr: Lozenge** 1 PO dissolved 5 × /day × 2 wk or adults 1 lozenge dissolved tid (prevention)

Available forms: Topical cream, solution, 1%; vaginal cream 1%, 2%; Lozenges, troches 10 mg

Administer:

Topical route

• Topical skin products are not for intravaginal therapy and are for external use only; do not use skin products near the eyes, nose, or mouth

• Wash hands before and after use; wash affected area and gently pat dry

• **Cream/solution:** Apply to the cleansed affected area; massage gently into affected areas

• **Troches:** Allow to dissolve, do not chew or swallow whole

Intravaginal route

• Only use dosage formulations specified for intravaginal use; intravaginal dosage forms are not for topical therapy; do not ingest

• **Cream:** Use applicator(s) supplied by the manufacturer

SIDE EFFECTS

GI: Nausea, vomiting
GU: Vaginal burning, irritation
INTEG: Burning, peeling, rash, pruritus

PHARMACOKINETICS

PO duration 3 hr

INTERACTIONS

Drug/Lab Test
Increase: LFTs

NURSING CONSIDERATIONS

Assess:

• **Allergic reaction:** Assess for hypersensitivity, product might need to be discontinued

• **Infection:** Assess for severity of infection, itching

Evaluate:

• Decreased infection, itching

Teach patient/family:

Topical route:

• That topical skin products are not for intravaginal therapy and are for external use only; do not use skin products near the eyes, nose, or mouth

• To wash hands before and after use; wash affected area and gently pat dry

• **Cream:** To shake well before use, apply a thin film to the cleansed affected area, massage gently into affected areas

PO route:

• **Troches**: Allow to dissolve, do not chew or swallow whole

Intravaginal route: To use only dosage formulations specified for intravaginal use; intravaginal dosage forms are not for topical therapy; do not ingest

• **Cream:** To use applicator(s) supplied by the manufacturer

cloZAPine (Rx)

(kloz'a-peen)
Clozaril, FazaClo
Func. class.: Antipsychotic
Chem. class.: Tricyclic dibenzodiazepine derivative

Do not confuse:
Clozaril/Clinoril/Colazal

ACTION: Interferes with dopamine receptor binding with lack of EPS; also acts as an adrenergic, cholinergic, histaminergic, serotonergic antagonist

USES: Management of psychotic symptoms for schizophrenic patients for whom other antipsychotics have failed; recurrent suicidal behavior
Unlabeled uses: Agitation, bipolar disorder, psychosis in dementia, psychosis in Parkinson's disease

CONTRAINDICATIONS: Hypersensitivity, severe granulocytopenia (WBC <3500 before therapy), coma

Black Box Warning: Myeloproliferative disorders, severe CNS depression, agranulocytosis, leukopenia, neutropenia, seizure disorder

Precautions: Pregnancy (B), breastfeeding, children <16 yr, geriatric patients; CV, pulmonary, cardiac, renal, hepatic disease; seizures, prostatic enlargement, closed-angle glaucoma, stroke

Black Box Warning: Bone marrow suppression, hypotension, myocarditis, orthostatic hypotension, seizures, geriatric patients with dementia-related psychosis

DOSAGE AND ROUTES

Schizophrenia
• **Adult: PO** 12.5 mg daily or bid; may increase by 25-50 mg/day; normal range 300-450 mg/day after 2 wk; do not increase dose more than 2×/wk; max 900 mg/day; use lowest dose to control symptoms

Dementia with multiple behavioral disturbances (unlabeled)
• **Geriatric: PO** 12.5 mg daily at bedtime, may increase by 12.5 mg every other day, max 50 mg/day

Available forms: Tabs 25, 50, 100, 200 mg; orally disintegrating tabs 25, 100 mg (Fazaclo: 12.5, 25, 100, 150, 200 mg)
Administer:
• May be taken with or without food
• Patient-specific registration required before administration; if WBC <3500 cells/mm^3 or ANC <2000 cells/mm^3, therapy should not be started
• Check to confirm PO medication swallowed; monitor for hoarding or giving of medication to other patients, if hospitalized; avoid giving patient >7 days' worth of medication if outpatient
• **Orally disintegrating tab:** do not push through foil; leave in foil blister until ready to take, peel back foil, place tab in mouth; allow to dissolve, swallow; water is not needed

SIDE EFFECTS

CNS: Neuroleptic malignant syndrome, *sedation, salivation, dizziness, headache, tremors, sleep problems, akinesia, fever,* seizures, *sweating, akathisia, confusion, fatigue, insomnia,* depression, slurred speech, anxiety, *agitation,* dystonia, obsessive-compulsive symptoms
CV: *Tachycardia, hypo/hypertension,* chest pain, ECG changes, orthostatic hypotension
EENT: *Blurred vision*
GI: *Drooling or excessive salivation, constipation, nausea, abdominal discomfort, vomiting, diarrhea,* anorexia, *weight gain, dry mouth,* heartburn, *dyspepsia, gastroesophageal reflux*
GU: *Urinary abnormalities,* incontinence, ejaculation dysfunction; frequency, urgency, retention, dysuria
HEMA: Leukopenia, agranulocytosis, eosinophilia
MS: Weakness; pain in back, neck, legs; spasm, *rigidity*
OTHER: *Diaphoresis*
RESP: Dyspnea, nasal congestion, lower respiratory tract infection
SYST: Death among geriatric patients with dementia, aggravation of diabetes mellitus

PHARMACOKINETICS

Bioavailability 27%-47%; 97% protein bound; completely metabolized by liver enzymes involved in metabolism CYP1A2, 2D6, 3A4; excreted in urine (50%), feces (30%) (metabolites); half-life 8-12 hr

INTERACTIONS

Increase: CNS depression—CNS depressants, psychoactives, alcohol

Increase: cloZAPine level—caffeine, citalopram, FLUoxetine, sertraline, ritonavir, risperiDONE, CYP1A2 inhibitors (fluvoxaMINE), CYP3A4 inhibitors (ketoconazole, erythromycin)

Increase: plasma concentration—warfarin, digoxin, other highly protein-bound products

Increase: QT prolongation—β blockers, class IA/III antidysrhythmias, and other drugs that increase QT

Increase: hypotension, respiratory, cardiac arrest, collapse—benzodiazepines

Decrease: cloZAPine level—CYP1A2 inducers (carBAMazepine, omeprazole, rifampin); PHENobarbital

Drug/Lab Test

Increase: LFTs, cardiac enzymes, cholesterol, blood glucose, bilirubin, PBI, cholinesterase, ^{131}I

False positive: pregnancy tests, PKU

False negative: urinary steroids, 17-OHCS

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Myocarditis; if suspected, discontinue use; myocarditis usually occurs during 1st month of treatment

Black Box Warning: Seizures; usually occur with higher doses >600 mg/day or dosage change >100 mg/day; do not use in uncontrolled seizure disorder, use cautiously in those with a predisposition to seizures

• I&O ratio; obtain baseline before treatment begins; palpate bladder if low urinary output occurs

Black Box Warning: **Bone marrow depression:** bilirubin, CBC, LFTs monthly; discontinue treatment if WBC <3000/mm^3 or ANC <1500/mm^3; test weekly; may resume when normal; if WBC <2000/mm^3 or ANC <1000/mm^3, discontinue

• Urinalysis recommended before, during prolonged therapy

• Affect, orientation, LOC, reflexes, gait, coordination, sleep pattern disturbances

Black Box Warning: **Hypotension:** B/P standing and lying; take pulse, respirations q4hr during initial treatment; establish baseline before starting treatment; report drops of 30 mm Hg

• Dizziness, faintness, palpitations, tachycardia on rising

• **EPS** including akathisia (inability to sit still, no pattern to movements), tardive dyskinesia (bizarre movements of the jaw, mouth, tongue, extremities), pseudoparkinsonism (rigidity, tremors, pill rolling, shuffling gait)

Neuroleptic malignant syndrome: tachycardia, seizures, fever, dyspnea, diaphoresis, increased/decreased B/P; notify prescriber immediately

• Constipation, urinary retention daily; if these occur, increase bulk, water in diet, especially for geriatric patients; stool softeners, laxatives may be needed

• If diabetic, check blood glucose levels

Perform/provide:

• Supervised ambulation until stabilized on medication; do not involve patient in strenuous exercise program because fainting is possible; patient should not stand still for long periods

• Storage in tight, light-resistant container

Evaluate:

• Therapeutic response: decrease in emotional excitement, hallucinations, delusions, paranoia, reorganization of patterns of thought, speech

Teach patient/family:

• About symptoms of agranulocytosis and need for blood tests weekly for 6 mo, then q2wk; to report flulike symptoms

• That orthostatic hypotension often occurs; to rise gradually from sitting or lying position; to avoid hot tubs, hot showers, tub baths; hypotension may occur

- To avoid abrupt withdrawal of this product because EPS may result; that product should be withdrawn over 1-2 wk
- To avoid OTC preparations (cough, hay fever, cold) unless approved by prescriber, since serious product interactions may occur; to avoid use with alcohol or CNS depressants, increased drowsiness may occur
- About compliance with product regimen
- About EPS and necessity for meticulous oral hygiene, since oral candidiasis may occur

Black Box Warning: To report sore throat, malaise, fever, bleeding, mouth sores; if these occur, CBC should be drawn and product discontinued

- That heat stroke may occur in hot weather; to take extra precautions to stay cool
- To avoid driving, other hazardous activities; seizures may occur
- To notify prescriber if pregnant or if pregnancy is intended; not to breastfeed

TREATMENT OF OVERDOSE:

Lavage, activated charcoal; provide an airway; do not induce vomiting

codeine (Rx)

(koe'deen)

Func. class.: Opiate analgesic, antitussive

Chem. class.: Opiate, phenathrene derivative

Controlled Substance Schedule II, III, IV, V (depends on content)

Do not confuse:

codeine/Lodine/iodine/Cardene

ACTION:

Depresses pain impulse transmission at the spinal cord level by interacting with opioid receptors; decreases cough reflex, GI motility

USES:

Moderate to severe pain

Unlabeled uses: Diarrhea, arthralgia, bone/dental pain, headache, migraine, myalgia, nonproductive cough

C

CONTRAINDICATIONS:

Breastfeeding, hypersensitivity to opiates, respiratory depression, increased intracranial pressure, seizure disorders, severe respiratory disorders

Precautions: Pregnancy (C), geriatric patients, cardiac dysrhythmias, prostatic hypertrophy, bowel impaction

DOSAGE AND ROUTES

Pain

- **Adult: PO** 15-60 mg q4hr prn
- **Child 6-17 yr: PO** 3 mg/kg/day in divided doses q4hr prn

Cough

- **Adult: PO** 10-20 mg q4-6hr, max 120 mg/day

Renal disease

- **Adult: PO** CCr 10-50 ml/min, 75% of dose; CCr <10 ml/min, 50% of dose

Diarrhea (unlabeled)

- **Adult: PO** 30 mg; may repeat qid prn

Arthralgia/bone pain/back pain/dental pain/headache/migraine/myalgia (unlabeled)

- **Adult: PO** 15-60 mg q4-6hr
- **Child ≥3 yr: PO** 0.5-1 mg/kg or 15 mg/m² (max 60 mg/dose) q4-6hr

Available forms: Tabs 15, 30, 60 mg; inj 15, 30 mg/ml; oral sol 30 mg/5 ml, 30 mg/5 ml sol

Administer:

Discontinue gradually after long-term use

SIDE EFFECTS

CNS: *Drowsiness, sedation,* dizziness, agitation, dependency, lethargy, restlessness, euphoria, seizures, hallucinations, headache, confusion

CV: Bradycardia, palpitations, orthostatic hypotension, tachycardia, circulatory collapse

GI: *Nausea, vomiting, anorexia, constipation,* dry mouth
GU: Urinary retention
INTEG: Flushing, rash, urticaria, pruritus
RESP: Respiratory depression, respiratory paralysis, dyspnea
SYST: Anaphylaxis

PHARMACOKINETICS

Bioavailability 60%-90%; peak ½-1 hr; duration 4-6 hr; metabolized by liver (CYP3A4 to morphine); excreted by kidneys, in breast milk; crosses placenta; half-life 3 hr; protein binding 7%; altered codeine metabolism occurs in different ethnic groups
PO: Onset 30-60 min

INTERACTIONS

Increase: CNS depression—CYP2D6, alcohol, opiates, sedative/hypnotics, antipsychotics, skeletal muscle relaxants
⚠ **Increase:** toxicity—MAOIs; use cautiously
Drug/Lab Test
Increase: lipase, amylase

NURSING CONSIDERATIONS

Assess:
• **Pain:** intensity, type, location, aggravating, alleviating factors; need for pain medication, tolerance; use pain scoring
• I&O ratio; check for decreasing output; may indicate urinary retention, especially among geriatric patients
• GI function: nausea, vomiting, constipation
• **Cough:** type, duration, ability to raise secretion for productive cough; do not use to suppress productive cough
• CNS changes, dizziness, drowsiness, hallucinations, euphoria, LOC, pupil reaction
• Allergic reactions: rash, urticaria
⚠ **Respiratory dysfunction:** respiratory depression, character, rate, rhythm; notify prescriber if respirations are <10/min, shallow; obstructive sleep apnea (children) (tonsillectomy/adenoidectomy)

Perform/provide:
• Storage in light-resistant container at room temp
Evaluate:
• Therapeutic response: decrease in pain, absence of grimacing, decreased cough, decreased diarrhea
Teach patient/family:
• Not to breastfeed
• To report any symptoms of CNS changes, allergic reactions
• That physical dependency may result after extended periods
• To decrease dry mouth use sugarless gum, rinse mouth often
• To change position slowly; orthostatic hypotension may occur
• To avoid hazardous activities if drowsiness, dizziness occurs
• To avoid alcohol, other CNS depressants unless directed by prescriber

TREATMENT OF OVERDOSE:

Naloxone 0.4-mg ampule diluted in 10 ml 0.9% NaCl and given by direct IV push, 0.02 mg q2min (adult)

colchicine (Rx)

(kol'chih-seen)
Colcrys
Func. class.: Antigout agent
Chem. class.: *Colchicum autumnale* alkaloid

ACTION: Inhibits microtubule formation of lactic acid in leukocytes, which decreases phagocytosis and inflammation in joints

USES: Gout, gouty arthritis (prevention, treatment); to arrest the progression of neurologic disability in those with MS, Mediterranean fever
Unlabeled uses: Hepatic cirrhosis, pericarditis, amyloidosis, Behçet's syndrome, biliary cirrhosis, dermatitis herpetiformis, idiopathic thrombocytopenic

purpura, Paget's disease, pseudogout, pulmonary fibrosis

CONTRAINDICATIONS: Pregnancy (D) (injectable), serious GI, severe cardiac/renal/hepatic disorders, hypersensitivity

Precautions: Pregnancy (C) (PO), breastfeeding, children, geriatric patients, blood dyscrasias, hepatic disease

DOSAGE AND ROUTES

Gout prevention

- **Adult: PO** 0.6-1.2 mg/day, depending on severity

Gout treatment

- **Adult: PO** 1.2 mg initially, then 0.6 mg 1 hr later (1.8 mg); for those on strong CYP3A4 inhibitor (during past 14 days), 0.6 mg initially, then 0.3 mg 1 hr later

Renal dose

- **Adult: PO** CCr <30 ml/min, for acute gout, do not repeat course for 2 wk; for familial Mediterranean fever, 0.3 mg daily, increase cautiously

Mediterranean fever (unlabeled)

- **Adult on no interacting products: PO** 1.2-2.4 mg/day in 1-2 divided doses; strong CYP3A4 inhibitor; P-glycoprotein inhibitors within 14 day: max 0.6 mg/day in 1-2 divided doses; moderate CYP3A4 inhibitors with 14 day: max 1.2 mg/day in 1-2 divided doses
- **Adolescent: PO** 1.2-2.4 mg/day in 1-2 divided doses, titrate by 0.3 mg/day
- **Child > 6-12 yr: PO** 0.9-1.8 mg/day in 1-2 divided doses
- **Child 4-6 yr: PO** 0.3-1.8 mg/day in 1-2 divided doses

Amyloidosis/biliary cirrhosis/dermatitis herpetiformis/Paget's disease/Behçet's syndrome/chronic idiopathic thrombocytopenic purpura/pulmonary fibrosis (unlabeled)

- **Adult: PO** 0.5-0.6 mg bid-tid

Available forms: Tabs 0.5, 0.6, 1 ✦ mg

Administer:

PO route

- Without regard to food
- Cumulative doses ≤4 mg, renal patients ≤2 mg; when reached, administer only for 3 wk

C

SIDE EFFECTS

GI: *Nausea, vomiting, anorexia, malaise,* metallic taste, cramps, peptic ulcer, diarrhea

GU: Hematuria, oliguria, renal damage

HEMA: Agranulocytosis, thrombocytopenia, aplastic anemia, pancytopenia

INTEG: Chills, dermatitis, pruritus, purpura, erythema

MISC: Myopathy, alopecia, reversible azoospermia, peripheral neuritis

PHARMACOKINETICS

PO: Peak ½-2 hr, half-life 4.4 hr, deacetylates in liver, excreted in feces (metabolites/active product)

INTERACTIONS

Increase: colchicine level/toxicity—moderate/strong CYP3A4 inhibitors, reduce dose

Increase: GI effects—NSAIDs, ethanol

Increase: bone marrow depression—radiation, bone marrow depressants, cycloSPORINE

Decrease: action of vit B_{12}; may cause reversible malabsorption

Drug/Food

Increase: colchicine level—grapefruit juice

Drug/Lab Test

Increase: alk phos, AST

Decrease: platelets, WBC, granulocytes

False positive: urine Hgb

Interference: urinary 17-hydroxycorticosteroids

NURSING CONSIDERATIONS

Assess:

- Relief of pain, uric acid levels returning to normal
- I&O ratio; observe for decrease in urinary output

⚠ CBC, platelets, reticulocytes before, during therapy (q3mo); may cause aplastic anemia, agranulocytosis, decreased platelets

• **Toxicity:** weakness, abdominal pain, nausea, vomiting, diarrhea; product should be discontinued, report symptoms immediately

Evaluate:

• Therapeutic response: decreased stone formation, decreased pain in kidney region, absence of hematuria, decreased pain in joints

Teach patient/family:

• To avoid alcohol, OTC preparations that contain alcohol

• To report any pain, redness, hard areas, usually in legs; rash, sore throat, fever, bleeding, bruising, weakness, numbness, tingling, nausea, vomiting, abdominal pain

• About the importance of complying with medical regimen (diet, weight loss, product therapy); about the possibility of bone marrow depression occurring

• Advise all providers of product use; surgery may increase possibility of acute gout symptoms

TREATMENT OF OVERDOSE:

D/C medication; may need opioids to treat diarrhea

colesevelam (Rx)

(koe-leh-seve'eh-lam)

WelChol

Func. class.: Antilipemic

Chem. class.: Bile acid sequestrant

ACTION: Adsorbs, combines with bile acids to form insoluble complex excreted through feces; loss of bile acids lowers cholesterol levels

USES: Elevated LDL cholesterol, alone or in combination with HMG-COA reductase inhibitor; type 2 diabetes (adjunct)

CONTRAINDICATIONS: Hypersensitivity, biliary obstruction, dysphagia, bowel disease, primary biliary cirrhosis, triglycerides >300 mg/dl, fat-soluble vitamin deficiency, bowel obstruction pancreatitis

Precautions: Pregnancy (B), breastfeeding, children

DOSAGE AND ROUTES

Monotherapy

• **Adult: PO** 3 625-mg tabs bid with meals or 6 tabs daily with meal; may increase to 7 tabs if needed

Combination therapy

• **Adult: PO** 3 tabs bid with meals or 6 tabs daily with meal given with an HMG-CoA reductase inhibitor

Type 2 diabetes, adjunct (to improve glycemic control)

• **Adult and geriatric: PO** Approx 3.8 g (6 tabs)/day or approx 1.9 g (3 tabs) bid

Heterozygous familial hypercholesterolemia

• **Females (postmenarchal and >10 yr) and males ≥10 yr: PO** 1.875-g packet bid or 3.75-g packet daily dissolved in 4-8 oz of water with meal

Available forms: Tabs 625 mg; powder for oral susp 3.75 g/packet

Administer:

• Swallow tabs whole; do not break, crush, or chew

• Drug daily or bid with meals; give all other medications 1 hr before or 4 hr after colesevelam; with liquid to avoid poor absorption

SIDE EFFECTS

CNS: Headache, dizziness, drowsiness, vertigo, tinnitus

GI: *Constipation, abdominal pain, nausea,* fecal impaction, hemorrhoids, flatulence, vomiting, GI obstruction

INTEG: Rash, irritation of perianal area, tongue, skin

MISC: Hypertriglycerides, hypoglycemia

MS: Muscle, joint pain

PHARMACOKINETICS

Excreted in feces, peak response 2 wk

INTERACTIONS

Decrease: absorption of diltiazem, gemfibrozil, mycophenolate, phenytoin, propranolol, warfarin, thiazides, digoxin, penicillin G, tetracyclines, corticosteroids, iron, thyroid, fat-soluble vitamins, glyburide

Decrease: action of—oral contraceptives

Drug/Lab Test

Increase: LFTs

NURSING CONSIDERATIONS

Assess:

- Cardiac glycoside level, if both products administered
- Fasting LDL, HDL, total cholesterol, triglyceride levels, electrolytes if on extended therapy
- Bowel pattern daily; increase bulk, water in diet for constipation

Evaluate:

- Therapeutic response: decreased total cholesterol level, LDL cholesterol, apolipoproteins

Teach patient/family:

- About the importance of compliance; toxicity may result if doses missed
- That risk factors should be decreased: high-fat diet, smoking, alcohol consumption, absence of exercise

conivaptan (Rx)

(kon-ih-vap'tan)

Vaprisol

Func. class.: Vasopressin receptor antagonist

ACTION: Dual arginine vasopressin (AVP) antagonist with affinity for V_{1A}, V_2 receptors; level of AVP in circulating blood is critical for regulation of water, electrolyte balance and is usually elevated in euvolemic/hypervolemic hyponatremia

USES: Euvolemia hyponatremia in hospitalized patients; not indicated for CHF, hypervolemic hyponatremia

CONTRAINDICATIONS: Hypersensitivity, hypovolemia

Precautions: Pregnancy (C), breastfeeding, orthostatic disease, renal disease, heart failure, rapid correction of serum sodium

C

DOSAGE AND ROUTES

- **Adult: IV INF** loading dose 20 mg given over 30 min then **CONT IV** over 24 hr; after 1 day, give for an additional 1-3 days as a **CONT INF** of 20 mg/day total; can be titrated up to 40 mg/day if serum sodium is not rising at desired rate; max time 4 days

Hepatic/renal dose

- **Adult: IV Child-Pugh A-C or CCr 30-60 ml/min:** give IV loading dose over 10 min then **CONT IV INF** 10 mg over 24 hr × 2-4 days

Available forms: 5 mg/ml (20 mg/4 ml) in single-use ampule; 20 mg/100 ml in D_5 for inj

Administer:

IV route

- Withdraw 4 ml (20 mg), add to 100 ml D_5W, gently invert several times to mix, give over 30 min; in large vein, change site every 24 hr to minimize vascular irritation

Continuous IV INF route

- Withdraw 4 ml (20 mg), add to 250 ml D_5W, gently invert several times to mix, give over 24 hr; or give 40 mg in 250 ml D_5W, gently invert several times to mix, give over 24 hr

SIDE EFFECTS

CNS: Headache, confusion, insomnia

CV: Atrial fibrillation, hypo/hypertension, *orthostatic hypotension,* phlebitis

GI: Nausea, vomiting, constipation, dry mouth

GU: Hematuria, polyuria, UTI, pollakiuria

HEMA: Anemia
INTEG: Erythemia, inj site reaction
META: Dehydration, hypo/hyperglycemia, hypokalemia, hypomagnesia, hyponatremia
MISC: Oral candidiasis, pain, peripheral edema, pneumonia

PHARMACOKINETICS

Protein binding 99%, metabolized by CYP3A4, terminal half-life 5 hr

INTERACTIONS

Increase: effect of—CYP3A4 substrates (alfuzosin, ARIPiprazole, bexarolene, bortezomib, bosentan, bupivacaine, buprenorphine, carBAMazepine, cevimeline, cilostazol, cinacalcet, clopidogrel, colchicine, cyclobenzaprine, dapsone, darifenacin, disopyramide, DOCEtaxel, donepezil, DOXOrubicin, dutasteride, eletriptan, eplerenone, ergots, erlotinib, eszopiclone, ethinyl estradiol, ethosuximide, etoposide, fentaNYL, galantamine, gefitinib, halofantrine, ifosfamide, irinotecan, levobupivacaine, levomethadyl, lidocaine, loperimide, loratadine, mefloquine, methadone, modafinil, PACLitaxel, paricalcitrol, pimozide, praziquantel, quiNIDine, quiNINE, ramelteon, reboxetine, repaglinide, rifabutin, sibutramine, sildenafil, sirolimus, SUFentanil, sunitinib, tacrolimus, tamoxifen, teniposide, testosterone, tiagabine, tinidazole, trimetrexate, vardenafil, vinca alkaloids, ziprasidone, zolpidem, zonisamide); do not use concurrently

NURSING CONSIDERATIONS

Assess:
- Renal, hepatic function
- Frequent sodium volume status; overly rapid correction of sodium concentration (>12 mEq/L per 24 hr) may result in osmotic demyelination syndrome
- Neurologic status: confusion, headache
- CV status: atrial fibrillation, hypo/hypertension, orthostatic hypotension; monitor B/P, pulse
- Monitor other electrolytes (magnesium and potassium)

Evaluate:
- Therapeutic response: correction of serum sodium levels

Teach patient/family:
- To report neurologic changes: headache, insomnia, confusion
- About administration procedure and expected results
- To report inj site pain, redness, swelling

CONTRACEPTIVES, HORMONAL

Monophasic, Oral

ethinyl estradiol/ desogestrel (Rx)

Apri, Cesia, Desogen, Kariva, Mircette, Ortho-Cept, Reclipsen, Solia, Velivet

ethinyl estradiol/ drospirenone (Rx)

Yasmin, Yaz 28, Ocella

ethinyl estradiol/ ethynodiol (Rx)

Kelnor 1/35, Zovia 1/35, Zovia 1/50

ethinyl estradiol/ levonorgestrel (Rx)

Alesse, Aviane-28, Enpresse, Jolessa, Lessina, Levlen, Levlite, Levora, Lutera, Nordette, Portia, Quasense, Seasonique, Sronyx

ethinyl estradiol/ norethindrone (Rx)

Brevicon, Genora 1/35, Junel 21 1/20, Junel 21 1.5/20, Loestrin 21 1.5/30, Loestrin 21 1/20, Microgestin, Modicon, N.E.E 1/35, Necon 0.5/35, Norcept-E 1/35, Norinyl 1+35, Nortrel 1/35, Nortrel 7/7/7

ethinyl estradiol/ norgestimate (Rx)
MonoNessa, Ortho-Cyclen, Previfem, Sprintec, Tri-Sprintec

ethinyl estradiol/ norgestrel (Rx)
Cryselle, Lo/Ovral, Low-Ogestrel, Ogestrel, Ovral

mestranol/ norethindrone (Rx)
Norinyl 1+50

Biphasic, Oral

ethinyl estradiol/ norethindrone (Rx)
Ortho-Novum 10/11

Triphasic, Oral

ethinyl estradiol/ desogestrel (Rx)
Cyclessa

ethinyl estradiol/ norethindrone (Rx)
Nortrel 7/7/7, Ortho-Novum 7/7/7, Tri-Norinyl

ethinyl estradiol/ norgestimate (Rx)
Ortho Tri-Cyclen, Ortho Tri-Cyclen Lo

ethinyl estradiol/ levonorgestrel (Rx)
Enpresse, Tri-Levlen, Triphasil

Extended Cycle, Oral

ethinyl estradiol/ levonorgestrel (Rx)
Seasonale

Progestin, Oral

norethindrone (Rx)
Errin, Ortho Micronor, Camila, Jolivette, Nor-Q D

Progressive Estrogen, Oral

ethinyl estradiol/ norethindrone acetate (Rx)
Estrostep, Estrostep Fe

Emergency

levonorgestrel/ethinyl estradiol (Rx)
Preven

levonorgestrel (Rx)
Plan B

medroxyprogesterone (Rx)
Depo-Provera

Intrauterine

levonorgestrel (Rx)
Mirena

Implant

etonogestrel (Rx)
Implanon

Vaginal Ring

ethinyl estradiol/ etonogestrel (Rx)
Nuva Ring

Transdermal

ethinyl estradiol/ norelgestromin (Rx)
Ortho Evra

C

ACTION: Prevents ovulation by suppressing FSH and LH; *monophasic:* estrogen/progestin (fixed dose) used during a 21-day cycle; ovulation is inhibited by suppression of FSH and LH; thickness of cervical mucus and endometrial lining prevents pregnancy; *biphasic:* ovulation is inhibited by suppression of FSH and LH; alteration of cervical mucus,

endometrial lining prevents pregnancy; *triphasic:* ovulation is inhibited by suppression of FSH and LH; change of cervical mucus, endometrial lining prevents pregnancy; variable doses of estrogen/progestin combinations may be similar to natural hormonal fluctuations; *extended cycle:* estrogen/progestin continuous for 84 days, off for 7 days, results in 4 menstrual periods/yr; *progressive estrogen:* constant progestin with 3 progressive doses of estrogen; *progestin-only pill, implant, intrauterine:* change of cervical mucus and endometrial lining prevents pregnancy; ovulation may be suppressed

USES: To prevent pregnancy, regulation of menstrual cycle, treatment of acne in women >14 yr for whom other treatment has failed, emergency contraception; *injection:* inhibits gonadotropin secretion, ovulation, follicular maturation; *emergency:* inhibits ovulation and fertilization, decreases transport of sperm and egg from fallopian tube to uterus; *vaginal ring, transdermal:* inhibits ovulation, prevents sperm entry into uterus; *antiacne:* may decrease sex hormone binding globulin, results in decreased testosterone

CONTRAINDICATIONS: Pregnancy (X), breastfeeding, women ≥40 yr, reproductive cancer, thrombophlebitis, MI, hepatic tumors, hepatic disease, CAD, CVA, breast cancer, jaundice, stroke, vaginal bleeding

Precautions: Depression, hypertension, renal disease, seizure disorders, lupus erythematosus, rheumatic disease, migraine headache, amenorrhea, irregular menses, gallbladder disease, diabetes mellitus, heavy smoking, acute mononucleosis, sickle cell disease

Black Box Warning: Tobacco smoking

DOSAGE AND ROUTES

Monophasic

- **Adult: PO** Take first tab on Sunday after start of menses × 21 days; skip 7 days, then repeat cycle; start on 1st day of menses × 21 days; skip 7 days, then repeat cycle; may contain 7 placebo tabs when 1 tab is taken daily

Biphasic

- **Adult: PO** Take 10 days of small progestin, then large progestin; estrogen is the same during cycle; skip 7 days, then repeat cycle; may contain 7 placebo tabs when 1 tab is taken daily

Triphasic

- **Adult: PO** Estrogen dose remains constant, progestin changes throughout 21-day cycle, some products contain 28 tabs per month

Extended cycle

- **Adult: PO** Start taking on 1st day of menses; continue for 84 days of active tab, then 7 days of placebo; repeat cycle

Progestin

- **Adult: PO** Start on 1st day of menses, then daily and continuously

Progressive estrogen

- **Adult: PO** Progestin dose remains constant, estrogen increases q7days throughout 21-day cycle, may include 7 placebo tabs for 28-day cycle

Emergency

- **Adult/adolescent:** Give within 72 hr of intercourse, repeat 12 hr later; **Plan B** 1 tab, then 1 tab 12 hr later; **Preven** 2 tab, then 2 tab 12 hr later; **Ovral (unlabeled)** 2 white tabs; **Lo/Ovral (unlabeled)** 4 white tabs; **Levlen (unlabeled), Nordette (unlabeled)** 4 orange tabs; **Triphasil (unlabeled), Tri-Levlen (unlabeled)** 4 yellow tabs

Injectable

- **Adult: IM (Depo-Provera)** 150 mg within 5 days of start of menses or within 5 days postpartum (must not be breastfeeding); if breastfeeding, give 6 wk postpartum, repeat q3mo

Intrauterine

- **Adult:** To be inserted using the levonorgestrel-releasing intrauterine system

(LARS) by those trained in procedure; inserted into uterine cavity within 7 days of the onset of menstruation; use should not exceed 5 yr per implant

Vaginal ring

• **Adult: VAG** Insert 1 ring on or prior to day 5 of cycle, leave in place 3 wk; remove for 1 wk, then repeat

Transdermal

• **Adult: TD** Apply patch within 7 days of menses, change weekly × 3 wk; no patch wk 4, repeat cycle

Implant

• **Adult: SUBDERMAL** In inner side of upper arm on days 1-5 of menses, replace q3yr

Acne

• **Adult: PO (Ortho Tri-Cyclen)** Take daily × 21 days, off 7 days

Administer:

• PO with food for GI symptoms; give at same time each day

• Subdermal implant of 6 caps effective for 5 yr, then should be removed

• IM inj deep in large muscle mass after shaking suspension; ensure patient not pregnant if inj are 2 wk or more apart

SIDE EFFECTS

CNS: Depression, fatigue, dizziness, nervousness, anxiety, headache

CV: Increased B/P, cerebral hemorrhage, thrombosis, pulmonary embolism, fluid retention, edema, MI

EENT: Optic neuritis, retinal thrombosis, cataracts

ENDO: Decreased glucose tolerance, increased TBG, PBI, T_4, T_3, temporary infertility

GI: *Nausea,* vomiting, cramps, diarrhea, bloating, constipation, change in appetite, cholestatic jaundice, weight change

GU: Breakthrough bleeding, amenorrhea, spotting, dysmenorrhea, galactorrhea, endocervical hyperplasia, vaginitis, cystitis-like syndrome, breast changes

HEMA: Increased fibrinogen, clotting factor

INTEG: *Chloasma, melasma,* acne, rash, urticaria, erythema, pruritus, hirsutism, alopecia, photosensitivity

PHARMACOKINETICS

Excreted in breast milk

INTERACTIONS

Decrease: oral contraceptives effectiveness—anticonvulsants, rifampin, analgesics, antibiotics, antihistamines, griseofulvin

Decrease: oral anticoagulants action

Drug/Herb

• Altered action: black cohosh

Decrease: oral contraceptives effect—saw palmetto, St. John's wort

Drug/Food

Increase: peak level—grapefruit juice

Drug/Lab Test

Increase: PT; clotting factors VII, VIII, IX, X; TBG, PBI, T_4, platelet aggregability, BSP, triglycerides, bilirubin, AST, ALT

Decrease: T_3, antithrombin III, folate, metyrapone test, GTT, 17-OHCS

NURSING CONSIDERATIONS

Assess:

• Glucose, thyroid function, LFTs, BP

• Reproductive changes: changes in breasts, tumors; positive Pap smear; product should be discontinued

Evaluate:

• Therapeutic response: absence of pregnancy, endometriosis, hypermenorrhea

Teach patient/family:

• About detection of clots using Homan's sign

• To use sunscreen or avoid sunlight; photosensitivity can occur

• To take at same time each day to ensure equal product level

• To report GI symptoms that occur after 4 mo

• To use another birth control method during 1st week of oral contraceptive use

• To take another tablet as soon as possible if one is missed

• That, after product is discontinued, pregnancy may not occur for several months

• To report abdominal pain, change in vision, shortness of breath, change in

C

menstrual flow, spotting, breakthrough bleeding, breast lumps, swelling, headache, severe leg pain

- That continuing medical care is needed: Pap smear and gynecologic examinations q6mo
- To notify health care providers and dentists of oral contraceptive use

Black Box Warning: Do not smoke, increased risk of CV side effects

⚠ HIGH ALERT

crizotinib

(kriz-oh'ti-nib)

XALKORI

Func. class.: Antineoplastic; biologic response modifiers

Chem. class.: Signal transduction inhibitors (STIs)

ACTION: Inhibits receptor tyrosine kinases (anaplastic lymphoma kinase (ALK), Hepatocyte Growth Factor Receptor (HGFR, c-Met), Recepteur d'Origine Nantais (RON)

USES: Locally advanced or metastatic non–small-cell lung cancer (NSCLC) that is anaplastic lymphoma kinase (ALK)-positive as detected by an FDA-approved test

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, hypersensitivity

Precautions: Neonates, infants, children, adolescents, pneumonitis, severe hepatic disease, congenital long QT syndrome, severe renal impairment, end-stage renal disease, vision disorders

DOSAGE AND ROUTES

- **Adult: PO** 250 mg bid, continue as long beneficial

Dose adjustments for hematologic toxicities

- **For Grade 1-2:** no dosage adjustment needed; **Grade 3:** interrupt treatment until toxicity resolves to grade ≤2, then continue with the same dosage schedule. In case of recurrence after a grade 4 event with dose reduction, interrupt treatment until toxicity resolves to grade ≤2; when resuming treatment, reduce dosage to 250 mg PO daily; **Grade 4:** interrupt treatment until toxicity resolves to grade ≤2; when resuming treatment, reduce dosage to 200 mg PO bid. In case of grade 4 recurrence, permanently discontinue treatment

Dose adjustments for hepatic laboratory abnormalities

- **For Grade 1:** No dosage adjustment necessary; **Grade 2 ALT/AST elevations with grade ≤1 total bilirubin elevations:** no dosage adjustment necessary; **Grade 3-4 ALT/AST elevations with grade ≤1 total bilirubin elevations:** interrupt treatment until toxicity resolves to grade ≤1 or baseline; when resuming treatment, reduce dosage to 200 mg PO bid; in case of recurrence, interrupt treatment until toxicity resolves to grade ≤1, and when resuming treatment, reduce dosage to 250 mg PO daily; permanently discontinue treatment in case of further recurrence; **Grade 2-4 ALT/AST elevations with concurrent Grade 2-4 total bilirubin elevations (in the absence of cholestasis or hemolysis):** permanently discontinue treatment

Dose adjustments for pneumonitis not attributable to NSCLC progression, other pulmonary disease, infection, or radiation effect

- **For any grade pneumonitis:** permanently discontinue

Dose adjustment for QTc prolongation:

- **For Grade 1-2 QTc prolongation:** no dosage adjustment necessary; **For Grade 3 QTc prolongation:** interrupt treatment until toxicity resolves to grade ≤1; when resuming treatment, reduce dosage to

200 mg PO bid; in case of recurrence, interrupt treatment until toxicity resolves to grade ≤1 and when resuming treatment, reduce dosage to 250 mg PO daily; permanently discontinue in case of further recurrence; **For Grade 4 QTc prolongation:** permanently discontinue

Available forms: Cap 200, 250 mg

Administer:

- May be taken orally with or without food
- Have the patient swallow capsule whole; do not crush or chew
- If a dose is missed, it can be taken up to 6 hr before the next dose is due to maintain the twice daily regimen. Do not take both doses at the same time

SIDE EFFECTS

CNS: Dizziness, balance disorder, presyncope, neuropathy (motor and sensory), burning sensation, dysesthesia, hyperesthesia, hypoesthesia, neuralgia, paresthesias, peripheral neuropathy (motor and sensory), headache, insomnia

CV: QT prolongation, disseminated intravascular coagulation (DIC), septic shock, bradycardia

EENT: *Diplopia, photopsia,* photophobia, *blurred vision,* visual field defect, *vitreous floaters,* visual brightness, reduced *visual acuity;* esophageal disorders

GI: *Nausea, diarrhea, vomiting, constipation,* decreased appetite, dysgeusia, abdominal pain, abdominal discomfort/pain, stomatitis, oral ulceration, glossodynia, glossitis, cheilitis, mucosal inflammation, oropharyngeal pain/discomfort, oral pain, esophageal disorder, elevated hepatic enzymes and hyperbilirubinemia, hepatotoxicity, dyspepsia, dysphagia, epigastric discomfort/pain, burning, esophagitis, esophageal obstruction/pain/spasm, esophageal ulceration, gastroesophageal reflux, odynophagia, and reflux esophagitis

HEMA: Grade 3/4 neutropenia, thrombocytopenia, lymphopenia

MISC: Fatigue, fever, *edema,* localized/peripheral edema, chest pain (unspecified), chest discomfort, musculoskeletal chest pain, arthralgia, back pain, *rash*

RESP: Severe, life-threatening pneumonitis, pneumonia, hypoxia, acute respiratory distress syndrome (ARDS), dyspnea, empyema, pulmonary hemorrhage, pulmonary embolism, upper respiratory tract infection (nasopharyngitis, pharyngitis, rhinitis), cough

PHARMACOKINETICS

Protein binding 91%; distribution into the tissues and plasma; metabolized by the CYP3A4/5; primary metabolic pathways are oxidation to metabolites; terminal half-life 42 hr; excreted 63% feces, 22% urine; unchanged drug 53% feces, 2.3% urine; absolute bioavailability is 43%; peak is 4-6 hr; steady state is reached within 15 days; dosage adjustments may need to be made in hepatic/renal disease and Asian patients

INTERACTIONS

Increase: CYP3A4 inhibitors (ketoconazole, atazanavir, indinavir, itraconazole, nefazodone, nelfinavir, ritonavir, voriconazole, boceprevir, delavirdine, isoniazid, dalfopristin; quinupristin, tipranavir)

Decrease: CYP3A4 inducers (rifampin, carBAMazepine, PHENobarbital, phenytoin, rifabutin); antacids, H2-blockers, proton pump inhibitors (PPIs)

Increase: action of—midazolam

Avoid use with CYP3A4 substrates(alfentanil, cycloSPORINE, ergotamine, dihydroergotamine fentaNYL, sirolimus, colchicine)

Increase: QT prolongation, torsades de pointes—arsenic trioxide, certain phenothiazines (chlorproMAZINE, mesoridazine, thioridazine), grepafloxacin, levomethadyl, pentamidine, probucol, sparfloxacin, troleandomycin, class IA antiarrhythmics (disopyramide, procainamide, quiNIDine), class III antiarrhythmics (amiodarone, dofetilide, ibutilide, sotalol), clarithromycin, ziprasidone, pimozide, haloperidol,

halofantrine, quiNIDine, chloroquine, dronedarone, droperidol, erythromycin, methadone, posaconazole, propafenone, saquinavir, abarelix, amoxapine, apomorphine, asenapine, β-agonists, ofloxacin, eribulin, ezogabine, flecainide, gatifloxacin, gemifloxacin, halogenated anesthetics, iloperidone, levofloxacin, local anesthetics, magnesium sulfate, potassium sulfate, sodium, maprotiline, moxifloxacin, nilotinib, norfloxacin, ciprofloxacin, olanzapine, paliperidone, some phenothiazines (fluPHENAZine, perphenazine, prochlorperazine, trifluoperazine), telavancin, tetrabenazine, tricyclic antidepressants, venlafaxine, vorinostat, citalopram, alfuzosin, cloZAPine, cyclobenzaprine, dolasetron, palonosetron, QUEtiapine, rilpivirine, SUNItinib, tacrolimus, tacrolimus, vardenafil, indacaterol, dasatinib, fluconazole, lapatinib, lopinavir/ritonavir, mefloquine, octreotide, ondansetron, ranolazine, risperiDONE, telithromycin, vemurafenib

Drug/Herb

Do not use with St. John's wort

Drug/Food

Do not use with grapefruit juice

NURSING CONSIDERATIONS

Assess:

- **Severe, life-threatening, or fatal treatment-related** pneumonitis: all cases occurred within 2 mo of treatment initiation; monitor for pulmonary symptoms that may indicate pneumonitis, other causes of pneumonitis should be excluded; permanently discontinue in patients with treatment-related pneumonitis I
- **Hepatic disease:** liver function test (LFT) abnormalities, altered bilirubin levels may occur during treatment; monitor LFTs and bilirubin levels prior to treatment, then monthly; more frequent testing is needed in those presenting with grade 2 or greater toxicities; laboratory alterations should be managed with dose reduction, treatment interruption, or discontinuation
- **QT prolongation** has been reported with use of product; therefore, avoid crizotinib use in those patients; monitor ECG and electrolytes in patients with congestive heart failure, bradycardia, electrolyte imbalance (hypokalemia, hypomagnesemia), or in patients taking concomitant medications known to prolong the QT interval; treatment interruption, dosage adjustment, treatment discontinuation may be needed in patients who develop QT prolongation
- **Vision disorders,** generally start within 2 wk of the start of therapy; ophthalmological evaluation should be considered, particularly if patients experience photopsia or new or increased vitreous floaters; caution should be used when driving or operating machinery by patients who experience vision disorders
- **Pregnancy/breastfeeding:** identify if pregnancy is planned or suspected (pregnancy category D), do not breastfeed
- CBC with differential; BUN/creatinine

Perform/provide:

- Storage of capsules at room temperature

Evaluate:

- Decreasing spread of malignancy

Teach patient/family:

- That missed doses can be taken up to 6 hr before the next dose is due to maintain the twice daily regimen
- To use reliable contraception; both women and men of childbearing age should use adequate contraceptive methods during therapy and for at least 90 days after completing treatment, pregnancy category D
- To report immediately shortness of breath, cough, fatigue, visual changes
- Not to take with grapefruit juice
- To avoid activities requiring mental alertness until effects are known
- To report signs of QT prolongation (abnormal heartbeats, dizziness, syncope)
- To swallow caps whole and avoid contact with broken cap

cromolyn (OTC, Rx)

(kroe'moe-lin)

Gastrocrom, Nasalcrom

Func. class.: Antiasthmatic

Chem. class.: Mast cell stabilizer

Do not confuse:
Nasalcrom/Nasalide

ACTION: Stabilizes the membrane of the sensitized mast cell, thus preventing the release of chemical mediators after an antigen-IgE interaction

USES: Severe perennial bronchial asthma; prevention of exercise-induced bronchospasm; acute bronchospasm induced by environmental pollutants, mastocytosis, allergic rhinitis
Unlabeled uses: Food allergy, ulcerative colitis

CONTRAINDICATIONS: Hypersensitivity to this product or lactose; status asthmaticus, acute asthma
Precautions: Pregnancy (B), breastfeeding, children <5 yr (aerosol); <2 yr (nebulizer); <2 yr (nasal sol); oral <2 yr; renal/hepatic disease, safety not established; cardiac dysrhythmias, CAD

DOSAGE AND ROUTES

Allergic rhinitis
• **Adult and child >2 yr: NASAL SOL** 1 spray in each nostril tid-qid, max 6 doses/day
To prevent exercise-induced bronchospasm
• **Adult and child >5 yr: INH** 2 metered sprays inhaled ≤1 hr prior to exercise
Bronchial asthma
• **Adult and child >5 yr: INH** 2 metered sprays using inhaler qid; **NEB** 20 mg qid by nebulization
Systemic mastocytosis
• **Adult and child >12 yr: PO** 200 mg qid ½ hr before meals and at bedtime
• **Child 2-12 yr: PO** 100 mg qid ½ before meals and at bedtime
Ulcerative colitis (unlabeled)
• **Adult: PO** (Gastrocrom) 200 mg qid 20 min before meals and at bedtime, may double dose after 2 wk
• **Child 2-14 yr: PO** (Gastrocrom) 100 mg qid 20 min before meals and at bedtime, may double dose after 2-3 wk
Available forms: Nasal sol 5.2 mg/metered spray (40 mg/ml); neb sol 20 mg/2 ml; aerosol 800 mcg/actuation; oral conc 100 mg/5 ml
Administer:
• For oral conc: break open ampule, squeeze contents into glass of water, stir, drink

SIDE EFFECTS

CNS: *Headache, dizziness,* neuritis, confusion, drowsiness
EENT: Throat irritation, cough, nasal congestion, burning eyes, nasal stinging/irritation, sneezing
GI: Nausea, vomiting, anorexia, dry mouth, bitter taste
GU: Urinary frequency, dysuria
INTEG: Rash, urticaria, angioedema
MS: Joint pain/swelling
Oral conc:
CNS: Dizziness, headache, paresthesia, migraine, seizures, psychosis, anxiety, depression, hallucinations, insomnia
CV: Tachycardia, PVCs, palpitations
GI: Diarrhea, nausea, abdominal pain, constipation, dyspepsia, stomatitis, vomiting
HEMA: Polycythemia, neutropenia, pancytopenia
INTEG: Pruritus, rash, flushing, photosensitivity

PHARMACOKINETICS

Excreted unchanged in feces, half-life 80 min, 63%-76% protein binding

NURSING CONSIDERATIONS

Assess:
• Eosinophil count during treatment
• Respiratory status: rate, rhythm, characteristics, cough, wheezing, dyspnea

Perform/provide:
• Gargle, sip of water to decrease irritation in throat (INH/Neb)
Evaluate:
• Therapeutic response: decrease in asthmatic symptoms; congested, runny nose
Teach patient/family:
Nasal sol: Blow nose, hold pump between fingers; if 1st use, spray in air until fine mist occurs, insert nozzle in nostril, spray and breathe in through nose, repeat in other nostril
Aerosol (not for acute asthma): Take cover off mouthpiece, shake gently, breathe out slowly, place mouthpiece in mouth, close mouth around it, tilt head back, breathe in as the inhaler is depressed, remove, hold breath, then breathe out slowly
Inhalation: Do not swallow sol, empty ampule into power-driven nebulizer as directed; do not combine different meds
Oral: Take ½ hr before meals and at bedtime

crotamiton

(kroe-tam'-ih-tuhn)
Eurax
Func. class.: Scabicide/pediculicide

ACTION: Scabicidal and antipruritic properties; the mechanisms of these actions are not known, but the drug is toxic to the scabies mite; antipruritic effect may be due to counterirritation mechanisms

USES: Infestations of scabies, lice

CONTRAINDICATIONS: Hypersensitivity; raw, inflamed skin
Precautions: Pregnancy (C), children

DOSAGE AND ROUTES

• **Adult: TOP** After routine bath, apply over the entire body from the chin to the soles; do not apply to the face or head; repeat in 24 hr. Patient may take a cleansing bath 48 hr after the second dose
Treatment of pruritus
• **Adult: TOP** Apply topically by massaging gently into affected area until medication is completely absorbed; repeat if needed
Available forms: Lotion, cream 10%
Administer:
• The cream and lotion are for topical use only to the skin; shake lotion well before use; do not apply in the eyes or mouth; do not apply to raw, weeping, or inflamed skin until acute inflammation has subsided
Scabies: After taking a bath or shower, apply by massaging into the skin from the chin to the toes, including folds and creases; ensure use under fingernails (they should be trimmed short), because scabies are likely to remain under nails; a toothbrush may be used to apply under fingernails; if a toothbrush is used to apply, wrap it in paper and discard immediately after use; accidental use of the same toothbrush in the mouth could cause poisoning; a second application 24 hr later is recommended; a 60-g tube of cream or bottle of lotion is sufficient for 2 applications for most patients; clothing and bed linen should be changed the next morning. Contaminated clothing and bed linen may be washed in the hot cycle of the washing machine or dry cleaned; a cleansing bath should be taken 48 hours after the last application
Pruritus: Massage cream or lotion into affected areas until the medication is absorbed; repeat as needed

SIDE EFFECTS

INTEG: Irritation, rash

NURSING CONSIDERATIONS

Assess:
Scabies/Lice: Area of infestation, irritation, scales; itching, raw, peeling, in-

flamed skin; contamination of other family members

Evaluate:

- Decreasing infestation, itching

Teach patient/family:

- To stop using if irritation, rash occurs, wash off completely; not to use on raw, inflamed skin
- How to use (see dosage and routes)

cyanocobalamin (vit B_{12}) (OTC, Rx)

(sye-an-oh-koe-bal'a-min)

Anacobin ✤, Bedoz ✤, Cyanabin ✤, Cyanoject, Cyomin, Ener-B

hydroxocobalamin (OTC, Rx)

LA-12, Nascobal, Neuroforte-R, Vitamin B_{12}

Func. class.: Vit B_{12}, water-soluble vitamin

ACTION: Needed for adequate nerve functioning, protein and carbohydrate metabolism, normal growth, RBC development, cell reproduction

USES: Vit B_{12} deficiency, pernicious anemia, vit B_{12} malabsorption syndrome, Schilling test, increased requirements with pregnancy, thyrotoxicosis, hemolytic anemia, hemorrhage, renal/hepatic disease, nutritional supplementation

CONTRAINDICATIONS: Hypersensitivity, optic nerve atrophy

Precautions: Pregnancy (A), breastfeeding, children

DOSAGE AND ROUTES

Cyanocobalamin

- **Adult: PO** Up to 1000 mcg/day **SUBCUT/IM** 30-100 mcg/day × 1 wk, then 100-200 mcg/mo

Schilling test

- **Adult and child: IM** 1000 mcg in 1 dose
- **Child: PO** Up to 1000 mcg/day **SUBCUT/IM** 30-50 mcg/day × 2 wk, then 100 mcg/mo; **NASAL** 500 mcg q wk

Hydroxocobalamin

- **Adult: SUBCUT/IM** 30-50 mcg/day × 5-10 days then 100-200 mcg/mo
- **Child: SUBCUT/IM** 30-50 mcg/day × 5-10 days then 30-50 mcg/mo

Available forms: *Cyanocobalamin:* tabs 25, 50, 100, 250, 500, 1000, 5000 mcg; ext rel tabs 100, 200, 500, 1000 mcg; lozenges 100, 250, 500 mcg; nasal jel 500 mcg/spray; inj 100, 1000 mcg/ml; *hydroxocobalamin:* inj 1000 mcg/ml

Administer:

PO route

- With fruit juice to disguise taste; immediately after mixing
- With meals if possible for better absorption; large doses should not be used because most is excreted

IM route

- By IM inj for pernicious anemia for life unless contraindicated

Intranasal route

- Avoid use within 1 hr of hot fluids, food

IV route

- IV route not recommended but may be admixed in TPN solution

Additive compatibilities: Ascorbic acid, chloramphenicol, hydrocortisone, metaraminol, vit B/C

Solution compatibilities: Dextrose/Ringer's or LR combinations, dextrose/saline combinations, D_5W, $D_{10}W$, 0.45% NaCl, Ringer's or LR sol

Y-site compatibilities: Alfentanil, amikacin, aminophylline, ascorbic acid, atracurium, atropine, azaTHIOprine, aztreonam, benztropine, bretylium, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, cefamandole, ceFAZolin, cefmetazole, cefonicid,

cefoperazone, cefotaxime, cefoTEtan, cefOXitin, cefTAZidime, ceftizoxime, cefTRIAXone, cefuroxime, cephalothin, cephapirin, chloramphenicol, chlorproMAZINE, cimetidine, clindamycin, dexamethasone, digoxin, diphenhydrAMINE, DOBUTamine, DOPamine, doxycycline, enalaprilat, ePHEDrine, EPINEPHrine, epoetin alfa, erythromycin, esmolol, famotidine, fentaNYL, fluconazole, folic acid, furosemide, ganciclovir, gentamicin, glycopyrrolate, heparin, hydrocortisone, hydrOXYzine, imipenem-cilastatin, indomethacin, insulin (regular), isoproterenol hydrochloride, ketorolac, labetalol, lidocaine, magnesium, mannitol, meperidine, metaraminol, methicillin, methoxamine, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, mezlocillin, miconazole, midazolam, minocycline, morphine, moxalactam, multiple vitamins injection, nafcillin, nalbuphine, naloxone, netilmicin, nitroglycerin, nitroprusside, norepinephrine, ondansetron, oxacillin, oxytocin, papaverine, penicillin G potassium/sodium, pentamidine, pentazocine, PENTobarbital, PHENobarbital, phentolamine, phenylephrine, phytonadione, piperacillin, polymyxin B, potassium chloride, procainamide, prochlorperazine, promethazine, propranolol, protamine, pyridoxine, quiNIDine, ranitidine, ritodrine, sodium bicarbonate, succinylcholine, SUFentanil, theophylline, thiamine, ticarcillin, ticarcillin-clavulanate, tobramycin, tolazoline, trimetaphan, urokinase, vancomycin, vasopressin, verapamil, vitamin B complex with C

SIDE EFFECTS

CNS: Flushing, optic nerve atrophy
CV: CHF, peripheral vascular thrombosis, pulmonary edema
GI: *Diarrhea*
INTEG: Itching, rash, pain at inj site
META: Hypokalemia
SYST: Anaphylactic shock

PHARMACOKINETICS

Gastric intrinsic factor must be present for absorption to occur; stored in liver, kidneys, stomach; 50%-90% excreted in urine; crosses placenta; excreted in breast milk

INTERACTIONS

Increase: absorption—predniSONE
Decrease: absorption—aminoglycosides, anticonvulsants, colchicine, chloramphenicol, aminosalicylic acid, potassium preparations, cimetidine

Drug/Herb

Decrease: vit B_{12} absorption—goldenseal

Drug/Lab Test

False positive: intrinsic factor

NURSING CONSIDERATIONS

Assess:

- For vit B_{12} deficiency: red, beefy tongue; psychosis; pallor; neuropathy
- GI function: diarrhea, constipation
- Potassium levels during beginning treatment in megaloblastic anemia; q6mo in pernicious anemia; folic acid, plasma vit B_{12} (after 1 wk), reticulocyte counts
- Nutritional status: egg yolks, fish, organ meats, dairy products, clams, oysters: good sources of vit B_{12}
- For pulmonary edema, worsening of CHF in cardiac patients

Perform/provide:

- Protection from light, heat

Evaluate:

- Therapeutic response: decreased anorexia, dyspnea on exertion, palpitations, paresthesias, psychosis, visual disturbances

Teach patient/family:

- That treatment must continue for life for pernicious anemia
- To eat a well-balanced diet
- To avoid contact with persons with infection; that infections are common

TREATMENT OF OVERDOSE:
Discontinue product

cyclobenzaprine (Rx)
(sye-kloe-ben'za-preen)
Amrix, Fexmid, Flexeril
Func. class.: Skeletal muscle relaxant, central acting
Chem. class.: Tricyclic amine salt

Do not confuse:
cyclobenzaprine/cyproheptadine

ACTION:
Reduces tonic muscle activity at the brain stem; may be related to antidepressant effects

USES:
Adjunct for relief of muscle spasm and pain in musculoskeletal conditions
Unlabeled uses: Fibromyalgia

CONTRAINDICATIONS:
Children <12 yr, acute recovery phase of MI, dysrhythmias, heart block, CHF, hypersensitivity, intermittent porphyria, thyroid disease, QT prolongation
Precautions: Pregnancy (B), breastfeeding, geriatric patients, renal/hepatic disease, addictive personality

DOSAGE AND ROUTES
Musculoskeletal disorders
- **Adult/adolescent ≥15 yr: PO** 5 mg tid × 1 wk, max 30 mg/day × 3 wk
- **Adult: EXT REL** 15 mg/day, max 30 mg/day × 3 wk
- **Geriatric: PO** 5 mg tid

Hepatic dose
- **Adult (mild hepatic disease): PO** 5 mg, titrate slowly

Fibromyalgia (unlabeled)
- **Adult: PO** 10 mg at bedtime, titrated up

Available forms: Tabs 5, 10 mg; ext rel tab 15, 30 mg

Administer:
- Without regard to meals, give with food for GI symptoms
- Do not crush, break, chew ext rel cap

SIDE EFFECTS
CNS: *Dizziness, weakness, drowsiness,* headache, tremor, depression, insomnia, confusion, paresthesia, nervousness
CV: Postural hypotension, tachycardia, dysrhythmias
EENT: Diplopia, temporary loss of vision
GI: *Nausea,* vomiting, hiccups, dry mouth, constipation, hepatitis
GU: Urinary retention, frequency, change in libido
INTEG: Rash, pruritus, fever, facial flushing, sweating

PHARMACOKINETICS
PO: Onset 1 hr, peak 3-8 hr, duration 12-24 hr, half-life 1-3 days, metabolized by liver, excreted in urine, crosses placenta, excreted in breast milk

INTERACTIONS
- Do not use within 14 days of MAOIs, tramadol

Increase: QT interval—Class IA/III antidysrhythmics, and other products that increase QT interval
Increase: CNS depression—alcohol, tricyclics, opiates, barbiturates, sedatives, hypnotics

Drug/Herb
Increase: CNS depression—kava

NURSING CONSIDERATIONS
Assess:
- **Pain:** location, duration, mobility, stiffness at baseline, periodically
- **Allergic reactions:** rash, fever, respiratory distress
- Severe weakness, numbness in extremities

Perform/provide:
- Storage in tight container at room temp

• Assistance with ambulation if dizziness, drowsiness occur, especially for geriatric patients

Evaluate:

• Therapeutic response: decreased pain, spasticity; muscle spasms of acute, painful musculoskeletal conditions generally short term; long-term therapy seldom warranted

Teach patient/family:

• Not to discontinue medication abruptly; that insomnia, nausea, headache, spasticity, tachycardia will occur; that product should be tapered off over 1-2 wk

• Not to take with alcohol, other CNS depressants

• To avoid hazardous activities if drowsiness, dizziness occur

• To avoid using OTC medication (cough preparations, antihistamines) unless directed by prescriber

• To use gum, frequent sips of water for dry mouth

TREATMENT OF OVERDOSE:

Administer activated charcoal; use anticonvulsants if indicated; monitor cardiac function

cyclopentolate ophthalmic

See Appendix B

⚠ HIGH ALERT

cyclophosphamide (Rx)

(sye-kloe-foss'fa-mide)

Cytoxan, Procytox ✦

Func. class.: Antineoplastic alkylating agent

Chem. class.: Nitrogen mustard

Do not confuse:

cyclophosphamide/cycloSPORINE

Cytoxan/Cytosar/Cytotec/cytarabine

ACTION: Alkylates DNA is responsible for cross-linking DNA strands; activity is not cell-cycle–phase specific

USES: Hodgkin's disease, lymphomas, leukemia; cancer of female reproductive tract, breast, lung, prostate; multiple myeloma; neuroblastoma; retinoblastoma; Ewing's sarcoma; disseminated neuroblastoma, nephrotic syndrome

Unlabeled uses: Aplastic anemia, chronic idiopathic thrombocytopenic purpura, dermatomyositis, pneumonitis, polymyositis, SLE, scleroderma, RA, Behçet's syndrome, Churg-Strauss syndrome, polyarteritis nodosa, Wegener's granulomatosis, idiopathic pulmonary fibrosis, localized neuroblastoma, CLL

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, severely depressed bone marrow function, hypersensitivity, prostatic hypertrophy, bladder neck obstruction

Precautions: Radiation therapy, cardiac disease

DOSAGE AND ROUTES

• **Adult: PO** Initially 1-5 mg/kg over 2-5 days, maintenance is 1-5 mg/kg; **IV** initially 40-50 mg/kg in divided doses over 2-5 days, maintenance 10-15 mg/kg q7-10 days or 3-5 mg/kg q3days

• **Child: PO/IV** 2-8 mg/kg or 60-250 mg/m^2 in divided doses for 6 or more days; maintenance 10-15 mg/kg q7-10 days or 30 mg/kg q3-4wk; dose should be reduced by half when bone marrow depression occurs

Neuroblastoma

• **Child and infant: PO** 150 mg/m^2/day, days 1-7 with DOXOrubicin (**IV** 35 mg/m^2 on day 8) q21days × 5 cycles

• **Child: IV** 70 mg/kg/day with hydration on days 1, 2 with DOXOrubicin and vinCRIStine q21days for courses 1, 2, 4, 6 alternating with CISplatin and etoposide q21days for courses 3, 5, 7

Breast cancer

• **Adult: PO** 100-200 mg/m²/day or 2 mg/kg/day × 4-14 days; **IV** 500-1000 mg/m² on day 1 in combination with fluorouracil and methotrexate or DOXOrubicin or DOXOrubicin alone, also cyclophosphamide 600 mg/m²; may be given dose-dense on day 1 of q14days with DOXOrubicin (60 mg/m²) with growth-factor support

Operable node-positive breast cancer IV (TAC regimen)

• **Adult: IV** 500 mg/m² with DOXOrubicin (50 mg/m² **IV**) then docetaxel (75 mg/m²) **IV** given 1 hr later q3wk × 6 cycles

Nephrotic syndrome

• **Adult: PO** 2-3 mg/kg/day for up to 12 wk when corticosteroids are unsuccessful

Aplastic anemia (unlabeled)

• **Adult: IV** 45-50 mg/kg divided over 4 days

Behçet's syndrome/Churg-Strauss syndrome/polyarteritis nodosa/uveitis/Wegener's granulomatosis (unlabeled)

• **Adult: PO** 1-2 mg/kg/day, **IV** 0.5-1 g/m²

Rheumatoid arthritis (unlabeled)

• **Adult and child: PO** 1.5-2.5 mg/kg/day

CLL (unlabeled)

• **Adult: IV** 250 mg/m²/day on days 1-3 with fludarabine 30 mg/m²/day on days 1-3

Available forms: Inj 100, 200, 500 mg, 1, 2 g; tabs 25, 50 mg

Administer:

• Use cytotoxic handling procedures

• In AM so product can be eliminated before bedtime

• Fluids IV or PO before chemotherapy to hydrate patient

• Antacid before oral agent; give after evening meal, before bedtime

• Antiemetic 30-60 min before product and prn

• Allopurinol or sodium bicarbonate to maintain uric acid levels, alkalinization of urine

PO route

• Take on empty stomach; do not crush, break, chew tabs

• May be taken as a single dose or divided doses

• Take in AM or afternoon, avoid evening

Direct IV route

• Reconstitute with NS only

Intermittent IV INF route

• Use cytotoxic handling procedures

• IV after diluting 100 mg/5 ml of sterile water or bacteriostatic water; shake; let stand until clear; may be further diluted in ≤250 ml D_5 or NS; give 100 mg or less/min through 3-way stopcock of glucose or saline inf

• Use 21, 23, 25G needle; check site for irritation, phlebitis

Solution compatibilities: Amino acids 4.25%/D_{25}, D_5/0.9% NaCl, D_5W, 0.9% NaCl

Syringe compatibilities: Bleomycin, CISplatin, doxapram, DOXOrubicin, droperidol, fluorouracil, furosemide, heparin, leucovorin, methotrexate, metoclopramide, mitomycin, vinBLAStine, vinCRIStine

Y-site compatibilities: Acyclovir, alfentanil, allopurinol, amifostine, amikacin, aminocaproic acid, aminophylline, amiodarone, amphotericin B lipid complex, amphotericin B liposome, ampicillin, ampicillin-sulbactam, anidulafungin, atenolol, atracurium, azlocillin, aztreonam, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, caspofungin, cefamandole, ceFAZolin, cefepime, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, cefTAZidime, ceftizoxime, ceftRIAXone, cefuroxime, chloramphenicol, chlorproMAZINE, cimetidine, ciprofloxacin, cisatracurium, CISplatin, cladribine, clindamycin, codeine, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, DAUNOrubicin, dexamethasone, dexmedetomidine, dexrazoxane, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, dolasetron, DOPamine, doripenem, dox-

acurium, DOXOrubicin, DOXOrubicin liposomal, doxycycline, droperidol, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, ertapenem, erythromycin, esmolol, etoposide, famotidine, fenoldopam, fentaNYL, filgrastim, fluconazole, fludarabine, fluorouracil, foscarnet, fosphenytoin, furosemide, gallium, ganciclovir, gatifloxacin, gemcitabine, gentamicin, granisetron, haloperidol, heparin, hydrocortisone, HYDROmorphone, hydrOXYzine, IDArubicin, imipenem-cilastatin, inamrinone, insulin (regular), irinotecan, isoproterenol, kanamycin, ketorolac, labetalol, leucovorin, levofloxacin, levorphanol, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, melphalan, meperidine, meropenem, mesna, methohexital, methotrexate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, midazolam, milrinone, minocycline, mitoMYcin, mitoXANtrone, mivacurium, morphine, nafcillin, nalbuphine, naloxone, nesiritide, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxacillin, oxaliplatin, PACLitaxel, palonosetron, pamidronate, pancuronium, pantoprazole, PEMEtrexed, penicillin G potassium, pentamidine, PENTobarbital, PHENobarbital, phenylephrine, piperacillin, piperacillin-tazobactam, potassium chloride/phosphates, procainamide, prochlorperazine, promethazine, propofol, propranolol, quinupristin-dalfopristin, ranitidine, rapacuronium, remifentanil, riTUXimab, rocuronium, sargramostim, sodium acetate/bicarbonate/phosphates, succinylcholine, SUFentanil, sulfamethoxazole-trimethoprim, tacrolimus, teniposide, theophylline, thiopental, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, TNA, tobramycin, topotecan, TPN, trastuzumab, vancomycin, vasopressin, vecuronium, verapamil, vinBLAStine, vinCRIStine, vinorelbine, voriconazole, zidovudine, zoledronic acid

SIDE EFFECTS

CNS: Headache, dizziness
CV: Cardiotoxicity (high doses), myocardial fibrosis, congestive heart failure, pericarditis
ENDO: SIADH, gonadal suppression
GI: *Nausea, vomiting, diarrhea, weight loss,* colitis, hepatotoxicity
GU: Hemorrhagic cystitis, *hematuria, neoplasms, amenorrhea, azoospermia, sterility, ovarian fibrosis,* renal tubular fibrosis
HEMA: Thrombocytopenia, leukopenia, pancytopenia; myelosuppression
INTEG: *Alopecia,* dermatitis
META: Hyperuricemia
MISC: Secondary neoplasms, anaphylaxis
RESP: Pulmonary fibrosis, interstitial pneumonia

PHARMACOKINETICS

Metabolized by liver, excreted in urine, half-life 4-6½ hr, 50% bound to plasma proteins

INTERACTIONS

Increase: neuromuscular blockade—succinylcholine
Increase: cyclophosphamide toxicity—barbiturates
Increase: action of warfarin
Increase: bone marrow depression—allopurinol, thiazides
Increase: hypoglycemia—insulin
Decrease: digoxin levels—digoxin
Decrease: cyclophosphamide effect—chloramphenicol, corticosteroids
Decrease: antibody response—live virus vaccines

Drug/Herb

- Toxicity: St. John's wort

Drug/Lab Test

Increase: uric acid
False positive: Pap smear
False negative: PPD, mumps, trichophytin, *Candida, Trichophyton,* Pap smear

NURSING CONSIDERATIONS

Assess:

- **Hemorrhagic cystitis;** renal studies: BUN, serum uric acid, urine CCr before, during therapy; I&O ratio; report fall in urine output <30 ml/hr
- **Bone marrow depression:** CBC, differential, platelet count baseline, weekly; withhold product if WBC is <2500 or platelet count is <75,000; notify prescriber of results
- Pulmonary function tests, chest x-ray films before, during therapy; chest film should be obtained q2wk during treatment
- Monitor temp q4hr; elevated temp may indicate beginning infection
- **Hepatotoxicity:** hepatic studies before, during therapy (bilirubin, AST, ALT, LDH), as needed; jaundice of skin, sclera; dark urine, clay-colored stools; itchy skin; abdominal pain; fever; diarrhea
- **Bleeding:** hematuria, guaiac, bruising or petechiae, mucosa or orifices q8hr
- Dyspnea, crackles, unproductive cough, chest pain, tachypnea
- Effects of alopecia on body image, discuss feelings about body changes
- Buccal cavity q8hr for dryness, sores or ulceration, white patches, oral pain, bleeding, dysphagia; obtain prescription for viscous lidocaine (Xylocaine)

⚠ Symptoms that indicate severe allergic reaction: rash, pruritus, urticaria, purpuric skin lesions, itching, flushing

Perform/provide:

- Storage in tight container at room temp
- Increase fluid intake to 2-3 L/day to prevent urate deposits, calculi formation, reduce incidence of hemorrhagic cystitis
- Diet low in purines: organ meats (kidney, liver), dried beans, peas to maintain alkaline urine
- Rinsing of mouth tid-qid with water, club soda; brushing of teeth bid-tid with soft brush or cotton-tipped applicators for stomatitis; use unwaxed dental floss
- Warm compresses at inj site for inflammation

Evaluate:

- To take adequate fluids to eliminate product
- Therapeutic response: decreased tumor size, spread of malignancy

Teach patient/family:

- That amenorrhea can occur and may last up to 1 yr after therapy but is reversible after stopping treatment
- To report any changes in breathing or coughing
- That hair may be lost during treatment; a wig or hairpiece may make patient feel better; new hair may be different in color, texture
- To avoid foods with citric acid, hot or rough texture
- To report signs of infection: increased temp, sore throat, flulike symptoms
- To report signs of anemia: fatigue, headache, faintness, SOB, irritability
- To report bleeding (bruising, hematuria, petechiae); to avoid use of razors, commercial mouthwash
- To use reliable contraception during and for 4 mo after treatment; not to breastfeed
- To avoid use of aspirin products, ibuprofen
- To avoid vaccinations during therapy
- Advise patient on proper handling and disposal of chemotherapy drugs

cycloSPORINE (Rx)

(sye'kloe-spor-een)

Cyclosporine, modified Gengraf, Neoral, Pulminiq, Sandimmune

Func. class.: Immunosuppressant

Chem. class.: Fungus-derived peptide

Do not confuse:

cycloSPORINE/cycloSERINE/cyclophosphamide

SandIMMUNE/SandoSTATIN

ACTION: Produces immunosuppression by inhibiting lymphocytes (T)

USES: Organ transplants (liver, kidney, heart) to prevent rejection, rheumatoid arthritis, psoriasis

Unlabeled uses: Recalcitrant ulcerative colitis, aplastic anemia, Crohn's disease, GVHD, thrombocytopenia purpura, lupus, nephritis, myasthenia gravis, psoriatic arthritis, atopic dermatitis

CONTRAINDICATIONS: Breastfeeding, hypersensitivity to polyxyethylated castor oil (inj only); psoriasis or RA in renal disease (Neoral/Gengraf); Gengraf/Neoral used with PUVA/UVB, methotrexate, coal tar; ocular infections

Black Box Warning: Uncontrolled, malignant hypertension; radiation in psoriasis, neoplastic disease, sunlight (UV) exposure, renal disease/failure

Precautions: Pregnancy (C), geriatric patients, severe hepatic disease

DOSAGE AND ROUTES

Prevention of transplant rejection (nonmodified)

- **Adult and child: PO** 15 mg/kg several hr before surgery, daily for 2 wk, reduce dosage by 2.5 mg/kg/wk to 5-10 mg/kg/day; **IV** 5-6 mg/kg several hr before surgery, daily, switch to PO form as soon as possible

Prevention of transplant rejection (modified)

- **Adult and child: PO** 4-12 mg/kg/day divided q12hr, depends on organ transplanted

Rheumatoid arthritis (Neoral/Gengraf)

- **Adult: PO** 2.5 mg/kg/day divided bid, may increase 0.5-0.75 mg/kg/day after 8-12 wk, max 4 mg/kg/day

Psoriasis (Neoral/Gengraf)

- **Adult: PO** 2.5 mg/kg/day divided bid, × 4 wk, then increase by 0.5 mg/kg/day q2wk, max 4 mg/kg/day

Idiopathic thrombocytopenia purpura (unlabeled)

- **Adult: PO** 1.25-2.5 mg/kg bid

Severe aplastic anemia (unlabeled)

- **Adult and child: PO** 12 mg/kg/day or 15 mg/kg/day (child) with antithymocyte globulin (ATG)

Atopic dermatitis (unlabeled)

- **Adult/adolescent/child ≥2 yr: PO** 5 mg/kg/day

Crohn's disease that is resistant to/intolerant of corticosteroids (unlabeled)

- **Adult: PO** 2.5-15 mg/kg/day (nonmodified)

Available forms: Oral sol 100 mg/ml; soft gel cap 25, 50, 100 mg; inj 50 mg/ml; sol for inh 300 mg/4.8 ml

Administer:

PO route

- Do not break, crush, or chew caps
- Use pipette provided to draw up oral sol; may mix with milk or juice; wipe pipette, do not wash (Neoral)
- For several days before transplant surgery; give at same time of day
- With corticosteroids
- With meals for GI upset or in chocolate milk, milk, or orange juice (SandIMMUNE)
- With oral antifungal for candida infections

Rheumatoid arthritis

- Give Neoral or Gengraf 2.5 mg/kg/day divided bid; may use with salicylates, NSAIDs, PO corticosteroids
- Always give the daily dose of Neoral/Gengraf in 2 divided doses on consistent schedule
- Give initial SandIMMUNE PO dose 4-12 hr prior to transplantation as a single dose of 15 mg/kg, continue the single daily dose for 1-2 wk, then taper 5%/wk to a maintenance dose of 5-10 mg/kg/day

Intermittent IV INF route

- After diluting each 50 mg/20-100 ml of 0.9% NaCl or D_5W; run over 2-6 hr, use an inf pump, glass inf bottles only

Continuous IV INF route
- May run over 24 hr
- **For SandIMMUNE parenteral,** give ⅓ of PO dose, initial dose 4-12 hr before transplantation as a single IV dose 5-6 mg/kg/day, continue the single daily dose until PO can be used

Solution compatibilities: D_5W, NaCl 0.9%
Y-site compatibilities: Abciximab, alatrofloxacin, alfentanil, amikacin, aminocaproic acid, aminophylline, amphotericin B lipid complex, anidulafungin, argatroban, ascorbic acid injection, atenolol, atracurium, atropine, azaTHIOprine, aztreonam, benztropine, bivalirudin, bleomycin, bretylium, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, carmustine, caspofungin, cefamandole, ceFAZolin, cefmetazole, cefonicid, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, ceftaroline, cefTAZidime, ceftizoxime, ceftobiprole, cefTRIAXone, cefuroxime, cephalothin, cephapirin, chloramphenicol, chlorproMAZINE, cimetidine, ciprofloxacin, CISplatin, clindamycin, codeine, cyanocobalamin, cyclophosphamide, cytarabine, DACTINomycin, DAPTOmycin, DAUNOrubicin, dexamethasone, dexmedetomidine, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, doripenem, doxacurium, DOXOrubicin, doxycycline, enalaprilat, EPHEDrine, EPINEPHrine, epirubicin, epoetin alfa, eptifibatide, ertapenem, erythromycin, esmolol, etoposide, famotidine, fenoldopam, fentaNYL, fluconazole, fludarabine, fluorouracil, folic acid, furosemide, gallium, ganciclovir, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, heparin, hydrocortisone, HYDROmorphone, hydrOXYzine, ifosfamide, imipenem-cilastatin, indomethacin, irinotecan, isoproterenol, ketorolac, labetalol, lansoprazole, levofloxacin, lidocaine, linezolid, LORazepam, mannitol, mechlorethamine, meperidine, meropenem, methicillin, methotrexate, methoxamine, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, mezlocillin, micafungin, miconazole, midazolam, milrinone, minocycline, mitoXANtrone, morphine, moxalactam, multiple vitamins injection, nafcillin, naloxone, nesiritide, netilmicin, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxacillin, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pamidronate, pancuronium, pantoprazole, papaverine, PEMEtrexed, penicillin G potassium/sodium, pentamidine, pentazocine, phentolamine, phenylephrine, phytonadione, piperacillin, piperacillin-tazobactam, polymyxin B, potassium acetate/chloride, procainamide, prochlorperazine, promethazine, propofol, propranolol, protamine, pyridoxine, quiNIDine, quinupristin-dalfopristin, ranitidine, ritodrine, sargramostim, sodium acetate/bicarbonate, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiamine, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, tobramycin, trimetaphan, urokinase, vancomycin, vasopressin, vecuronium, verapamil, vinCRISTine, vinorelbine, zoledronic acid

SIDE EFFECTS

CNS: *Tremors, headache,* seizures, confusion, encephalopathy, migraine
GI: Nausea, vomiting, diarrhea, *oral candida, gum hyperplasia,* hepatotoxicity, pancreatitis
GU: Albuminuria, hematuria, proteinuria, renal failure, hemolytic uremic syndrome, nephrotoxicity
INTEG: Rash, acne, *hirsutism,* pruritus
META: Hyperkalemia, hypomagnesemia, hyperlipidemia, hyperuricemia
MISC: *Infection, hypertension*

PHARMACOKINETICS

Peak 4 hr; highly protein bound; half-life (biphasic) 1.2 hr, 25 hr; metabolized in liver; excreted in feces, 6% in urine; crosses placenta; excreted in breast milk

INTERACTIONS

Increase: action, toxicity of cycloSPORINE—allopurinol, amiodarone, amphotericin B, androgens, azole antifungals, β-blockers, bromocriptine, calcium channel blockers, carvedilol, cimetidine, colchicine, corticosteroids, fluoroquinolones, foscarnet, imipenem-cilastatin, macrolides, metoclopramide, oral contraceptives, NSAIDs, melphalan, SSRIs

Increase: effects of aliskiren, digoxin, etoposide, HMG-CoA reductase inhibitors, methotrexate, potassium-sparing diuretics, sirolimus, tacrolimus

Increase: action toxicity of—digoxin, colchicine

Decrease: cycloSPORINE action—anticonvulsants, nafcillin, orlistat, PHENobarbital, phenytoin, rifamycins, sulfamethoxazole-trimethoprim, terbinafine, ticlopidine

Decrease: antibody reaction—live virus vaccines

Drug/Food

- Slowed metabolism of product: grapefruit juice, food

NURSING CONSIDERATIONS

Assess:

- Renal studies: BUN, creatinine at least monthly during treatment, 3 mo after treatment
- Product blood level during treatment 12 hr after dose, toxic >400 ng/ml
- Hepatic studies: alk phos, AST, ALT, bilirubin; hepatotoxicity: dark urine, jaundice, itching, light-colored stools; product should be discontinued
- Serum lipids, magnesium, potassium, cycloSPORINE blood concentrations

⚠ **Encephalopathy:** impaired cognition, seizures, visual changes including blindness, loss of motor function, movement disorders and psychiatric changes; dosage reduction or discontinuation may be needed in severe cases

⚠ **Nephrotoxicity:** 6 wk after surgery, acute tubular necrosis, CyA trough level >200 ng/ml, gradual rise in creatinine (0.15 mg/dl/day), creatinine plateau <25% above baseline, intracapsular pressure <40 mm Hg

⚠ Signs/symptoms of encephalopathy lymphoma

Evaluate:

- Therapeutic response: absence of rejection

Teach patient/family:

- To report fever, chills, sore throat, fatigue, since serious infections may occur; tremors, bleeding gums, increased B/P
- To use contraceptive measures during treatment, for 12 wk after ending therapy; to notify prescriber if pregnancy is planned or suspected
- To take at same time of day, every day; not to skip doses or double dose; not to use with grapefruit juice or receive vaccines; that there are many drug interactions; not to add new or discontinued products without approval of prescriber

Black Box Warning: To limit UV exposure

- That treatment is lifelong to prevent rejection; to identify signs of rejection
- To report severe diarrhea because drug loss may result
- About the signs of nephrotoxicity: increased B/P, tremors of the hands, changes in gums, increased hair on body, face
- To continue with all lab work and follow-up appointments
- That types of products are not interchangeable
- Not to wash syringe/container with water, variation in dose may result

⚠ HIGH ALERT

cytarabine (Rx)

(sye-tare'a-been)

Ara-C, Cytosar ✱

cytarabine liposomal (Rx)

DepoCyt

Func. class.: Antineoplastic, antimetabolite

Chem. class.: Pyrimidine nucleoside analog

Do not confuse:
Cytosar/Cytoxan/Cytovene

ACTION: Competes with physiologic substrate of DNA synthesis, thus interfering with cell replication in the S phase of the cell cycle (before mitosis)

USES: Acute myelocytic leukemia, acute nonlymphocytic leukemia, chronic myelocytic leukemia; lymphomatous meningitis (intrathecal/intraventricular)
Unlabeled uses: Hodgkin's/non-Hodgkin's lymphoma, malignant meningitis, mantle cell lymphoma

CONTRAINDICATIONS: Pregnancy (D), hypersensitivity
Precautions: Breastfeeding, children, renal/hepatic disease, tumor lysis syndrome, infection, hyperkalemia, hyperphosphatemia, hyperuricemia, hypocalcemia

Black Box Warning: Bone marrow suppression

DOSAGE AND ROUTES

Acute myelogenous leukemia (AML)
• **Adult: CONT IV INF** 100 mg/m²/day × 7 days q2wk as single agent or 2-6 mg/kg/day (100-200 mg/m²/day) as a single dose or 2-3 divided doses for 5-10 days until remission, used in combination; maintenance 70-200 mg/m²/day for 2-5 days monthly; **SUBCUT/IM** maintenance 100 mg/m²/day × 5 days q28days
Meningeal leukemia
• **Adult/child: INTRATHECAL** 5-70 mg/m² variable daily × 4 days to q2-7days
Refractory acute Hodgkin's/refractory non-Hodgkin's lymphoma (unlabeled)
• **Adult/child: IV** 2 g/m²/day; on day 5 q21days, with etoposide, methylPREDNISolone, and CISplatin
Carcinomatous meningitis (liposoma)
• **Adult: IT** 50 mg over 1-5 min q14days, during induction and consolidation wk 1, 3, 5, 7, 9, give another 50 mg **IT** wk 13; maintenance 50 mg q28days on wk 17, 21, 25, 29 use with dexamethasone 4 mg **PO/IV** × 5 day on each day of cytarabine
Renal dose
• **Adult CCr ≤60 ml/min, serum creatinine 1.5-1.9 mg/dl or increase of 0.5-1.2 mg/dl from baseline during treatment:** reduce to 1 g/m²/dose; **serum creatinine ≥2 mg/dl or change from baseline serum creatinine was 1.2 mg/dl:** reduce to 100 mg/m²/day
Available forms: Powder for inj 100, 500 mg, 1, 2 g; sus rel, (DepoCyt) liposomal for intrathecal use 10 mg/ml
Administer:
• Antiemetic 30-60 min before product and prn
• Allopurinol to maintain uric acid levels and alkalinization of the urine
• Topical or systemic analgesics for pain
IT route
• Use preservative-free NS, add 5 ml/100-mg vial or 10 ml/500-mg vial; use immediately, discard unused product
• Use dexamethasone with IT administration
IV route
• Use cytotoxic handling precautions
Direct IV route
• After diluting 100 mg/5 ml of sterile water for inj; given by direct IV over 1-3 min through free-flowing tubing (IV)

Intermittent IV INF route
- May be further diluted in 50-100 ml NS or D_5W, given over 30 min to 24 hr, depending on dose

Continuous IV INF route
- May also be given by continuous inf

Additive compatibilities: Corticotropin, DAUNOrubicin with etoposide, etoposide, hydrOXYzine, lincomycin, mitoXANtrone, ondansetron, potassium chloride, prednisoLONE, sodium bicarbonate, vinCRIStine

Solution compatibilities: Amino acids, D_5/LR, D_5/0.2% NaCl, D_5/0.9% NaCl, D_{10}/0.9% NaCl, D_5W, invert sugar 10% in electrolyte #1, Ringer's, LR, 0.9% NaCl, sodium lactate 1/6 mol/L, TPN #57

Syringe compatibilities: Metoclopramide

Y-site compatibilities: Acyclovir, alfentanil, amifostine, amikacin, aminocaproic acid, aminophylline, amphotericin B lipid complex, amphotericin B liposome, ampicillin, ampicillin-sulbactam, amsacrine, anidulafungin, atenolol, atracurium, azithromycin, aztreonam, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, ceFAZolin, cefepime, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, ceftAZidime, ceftizoxime, ceftRIAXone, cefuroxime, chlorproMAZINE, cimetidine, ciprofloxacin, cisatracurium, CISplatin, cladribine, clindamycin, codeine, cyclophosphamide, cycloSPORINE, DAUNOrubicin, dexamethasone, dexmedetomidine, dexrazoxane, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, dolasetron, DOPamine, doxacurium, DOXOrubicin, DOXOrubicin liposomal, doxycycline, droperidol, enalaprilat, ePHEDrine, EPINEPHrine, ertapenem, erythromycin, esmolol, etoposide, famotidine, fenoldopam, fentaNYL, filgrastim, fluconazole, fludarabine, foscarnet, fosphenytoin, furosemide, gatifloxacin, gemcitabine, gemtuzumab, gentamicin, granisetron, haloperidol, heparin, hydrocortisone, HYDROmorphone, hydrOXYzine, IDArubicin, ifosfamide, imipenem-cilastatin, inamrinone, insulin (regular), irinotecan, isoproterenol, ketorolac, labetalol, leucovorin, levofloxacin, levorphanol, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, melphalan, meperidine, meropenem, mesna, methohexital, methotrexate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, midazolam, milrinone, minocycline, mitoXANtrone, mivacurium, morphine, nalbuphine, naloxone, nesiritide, niCARdipine, nitroglycerin, nitroprusside, norepinephrine, octreotide, ofloxacin, ondansetron, oxaliplatin, PACLitaxel, palonosetron, pamidronate, pancuronium, pantoprazole, PEMEtrexed, pentamidine, PENTobarbital, PHENobarbital, phenylephrine, piperacillin, piperacillin-tazobactam, potassium chloride/phosphates, procainamide, prochlorperazine, promethazine, propofol, propranolol, quinupristin-dalfopristin, ranitidine, rapacuronium, remifentanil, riTUXimab, rocuronium, sargramostim, sodium acetate/bicarbonate/phosphates, succinylcholine, SUFentanil, sulfamethoxazole-trimethoprim, tacrolimus, teniposide, theophylline, thiopental, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, TNA, tobramycin, trastuzumab, trimethobenzamide, vancomycin, vasopressin, vecuronium, verapamil, vinCRIStine, vinorelbine, voriconazole, zidovudine, zoledronic acid

SIDE EFFECTS

CNS: Neuritis, dizziness, headache, cerebellar syndrome, personality changes, ataxia, mechanical dysphasia, coma; chemical arachnoiditis (IT)

CV: Chest pain, cardiopathy

CYTARABINE SYNDROME: *Fever,* myalgia, bone pain, chest pain, *rash,* conjunctivitis, malaise (6-12 hr after administration)

EENT: Sore throat, conjunctivitis

GI: *Nausea, vomiting, anorexia, diarrhea, stomatitis,* hepatotoxicity, abdominal pain, hematemesis, GI hemorrhage

GU: Urinary retention, renal failure, hyperuricemia
HEMA: Thrombophlebitis, bleeding, thrombocytopenia, leukopenia, myelosuppression, anemia
INTEG: *Rash, fever,* freckling, cellulitis
META: Hyperuricemia
RESP: Pneumonia, dyspnea, pulmonary edema (high doses)
SYST: Anaphylaxis, tumor lysis syndrome

PHARMACOKINETICS

INTRATHECAL: Half-life 100-236 hr; metabolized in liver; excreted in urine (primarily inactive metabolite); crosses blood-brain barrier, placenta
IV/SUBCUT: Distribution half-life 10 min, elimination half-life 1-3 hr

INTERACTIONS

- Do not use with live virus vaccines
- Do not use within 24 hr of chemotherapy—sargramostim, GM-CSF, filgrastim, G-CSF

Increase: toxicity—immunosuppressants, methotrexate, flucytosine, radiation, or other antineoplastics
Increase: bleeding risk—anticoagulants, platelet inhibitors, salicylates, thrombolytics, NSAIDs
Decrease: effects of oral digoxin, gentamicin

NURSING CONSIDERATIONS

Assess:

Black Box Warning: **Bone marrow suppression:** CBC (RBC, Hct, Hgb), differential, platelet count weekly; withhold product if WBC is $<1000/mm^3$, platelet count is $<50,000/mm^3$, or RBC, Hct, Hgb low; notify prescriber of these results

- Renal studies: BUN, serum uric acid, urine CCr, electrolytes before and during therapy
- I&O ratio; report fall in urine output to <30 ml/hr
- Monitor temp, fever may indicate beginning infection; no rectal temps
- **Hepatotoxicity:** hepatic studies before and during therapy: bilirubin, ALT, AST, alk phos, as needed or monthly; check for jaundice of skin, sclera; dark urine; clay-colored stools; pruritus; abdominal pain; fever; diarrhea
- Blood uric acid during therapy

⚠ **For anaphylaxis:** rash, pruritus, facial swelling, dyspnea; resuscitation equipment should be nearby

⚠ **Chemical arachnoiditis (IT):** headache, nausea, vomiting, fever; neck rigidity pain, meningism, CSF pleocytosis; may be decreased by dexamethasone

- Cytarabine syndrome 6-12 hr after inf: fever, myalgia, bone pain, chest pain, rash, conjunctivitis, malaise; corticosteroids may be ordered
- Bleeding: hematuria, heme-positive stools, bruising or petechiae, mucosa or orifices q8hr

⚠ Dyspnea, crackles, unproductive cough, chest pain, tachypnea, fatigue, increased pulse, pallor, lethargy; personality changes, with high doses; pulmonary edema may be fatal (rare)

- Buccal cavity q8hr for dryness, sores or ulceration, white patches, oral pain, bleeding, dysphagia
- Local irritation, pain, burning, discoloration at inj site
- GI symptoms: frequency of stools, cramping; antispasmodic may be used
- Acidosis, signs of dehydration: rapid respirations, poor skin turgor, decreased urine output, dry skin, restlessness, weakness

Perform/provide:

- Increased fluid intake to 2-3 L/day to prevent urate deposits and calculi formation unless contraindicated
- Diet low in purines: absence of organ meats (kidney, liver), dried beans, peas to prevent increased urate deposits
- Rinsing of mouth tid-qid with water, club soda; brushing of teeth bid-tid with soft brush or cotton-tipped applicators for stomatitis; use unwaxed dental floss

Evaluate:
• Therapeutic response: improvement of hematologic parameters
Teach patient/family:
• To report any coughing, chest pain, changes in breathing; may indicate beginning **pneumonia, pulmonary edema**
• To avoid foods with citric acid, spicy or rough texture if stomatitis is present, use sponge brush and rinse with water after each meal; to report stomatitis: any bleeding, white spots, ulcerations in mouth; to examine mouth daily, report any symptoms
• To report signs of **infection:** increased temp, sore throat, flulike symptoms; to avoid crowds, persons with infections
• To report signs of **anemia:** fatigue, headache, faintness, SOB, irritability
• To report bleeding; to avoid use of razors, commercial mouthwash, salicylates, NSAIDs, anticoagulants
• To use thrombocytopenia precautions
• To take fluids to 3 L/day to prevent renal damage
• To use reliable contraception during treatment and for 4 mo thereafter; not to breastfeed
• To avoid receiving vaccines during treatment
• That fever, headache, nausea, vomiting likely to occur

dabigatran

(da-bye-gat'ran)

Pradaxa

Func. class.: Anticoagulant-thrombin inhibitor

ACTION: Direct thrombin inhibitor that inhibits both free and clot-bound thrombin, prevents thrombin-induced platelet aggregation and thrombus formation by preventing conversion of fibrinogen to fibrin

USES: Stroke/systemic embolism prophylaxis with nonvalvular atrial fibrillation

Unlabeled uses: Deep venous thrombus (DVT), pulmonary embolism prophylaxis

CONTRAINDICATIONS: Hypersensitivity, bleeding, prosthetic heart valves
Precautions: Pregnancy (C), labor, obstetric delivery, breastfeeding, children, geriatric patients, abrupt discontinuation, anticoagulant therapy, renal disease, surgery

DOSAGE AND ROUTES

Stroke prophylaxis
• **Adult: PO** 150 mg bid
For conversion from an alternative anticoagulant to dabigatran
• When converting from warfarin to dabigatran, discontinue warfarin and initiate dabigatran therapy when the INR is <2.0; when converting from a parenteral anticoagulant to dabigatran, initiate dabigatran 0-2 hr before the time of the next scheduled anticoagulant dose or at the time of discontinuation of a continuously administered anticoagulant (e.g., intravenous unfractionated heparin)
For conversion from dabigatran to warfarin
• **Adult:** CCr >50 ml/min, start warfarin 3 days before discontinuing dabigatran; CCr 31-50 ml/min, start warfarin 2 days before discontinuing dabigatran; CCr 15-30 ml/min, start warfarin 1 day before discontinuing dabigatran
For conversion from dabigatran to parenteral anticoagulants
• **Adult: PO** discontinue dabigatran, start parenteral anticoagulant 12 hr (CCr ≥30 ml/min) or 24 hr (CCr <30 ml/min) after the last dabigatran dose
Renal dose
• **Adult: PO** CCr 15-30 ml/min, 75 mg bid
Deep venous thrombus (DVT)/pulmonary embolism prophylaxis (unlabeled)
• **Adult: PO** 220 mg or 150 mg/day × 28-35 days, starting with ½ dose 1-4 hr after surgery

Available forms: Caps 75, 100 mg
Administer:
• Do not crush, break, chew, or empty contents of capsule
• If dose is missed, take as soon as remembered if on the same day; do not administer if <6 hr before next dose
• Without regard to food
• Store in original package at room temp until time of use; discard after 30 days, protect from moisture

SIDE EFFECTS

CNS: Intracranial bleeding
CV: Myocardial infarction
GI: Abdominal pain, dyspepsia, peptic ulcer, esophagitis, GERD, gastritis, GI bleeding
HEMA: Bleeding, hemorrhagic erosive gastritis
INTEG: Rash, pruritus
SYST: Anaphylaxis (rare)

PHARMACOKINETICS

Protein binding 35%, half-life 12-17 hr (extended in renal disease), peak 1 hr, high-fat meal delays peak

INTERACTIONS

Increase: bleeding risk—amiodarone, other anticoagulants, clopidogrel, ketoconazole, quiNIDine, thrombolytics, verapamil
Decrease: dabigatran effect—rifampin
Decrease: dabigatran effect—P-glycoprotein inducers (carBAMazepine, rifampin, tipranovir
Drug/Lab Test
Increase: thrombin time, aPTT

NURSING CONSIDERATIONS

Assess:
• **Bleeding:** blood in urine or emesis, dark tarry stools, lower back pain; caution with arterial/venous punctures, catheters, NG tubes; monitor vital signs frequently; elderly patients more prone to serious bleeding, monitor aPTT, ecarin clotting time baseline and during treatment
• **Thrombosis/MI/emboli:** swelling, pain, redness, difficulty breathing, chest pain, tachypnea, cough, coughing up blood, cyanosis
• **Postthrombotic syndrome:** pain, heaviness, itching/tingling, swelling, varicose veins, brownish/reddish skin discoloration, ulcers; use of ambulation, compression stockings, adequate anticoagulation can prevent this syndrome
• **Surgery:** discontinue 24-48 hr before surgery in those with CCr ≥50 ml/min, 72-96 hr in those with CCr <50 ml/min; longer times may be needed in major surgery
Evaluate:
• Therapeutic response: decreased thrombus formation/extension, absence of emboli, post-thrombotic effects
Teach patient/family:
• About the purpose and expected results of this product, to take at same time of day, not to skip or double doses
• To take without regard to food, swallow cap whole
• To avoid all other products unless approved by prescriber
• To notify all providers that this product is being used
• To report any bleeding including blood in stool, emesis, urine; nosebleeds

⚠ HIGH ALERT

dacarbazine (Rx)

(da-kar'ba-zeen)
DTIC ✤, DTIC-Dome
Func. class.: Antineoplastic alkylating agent
Chem. class.: Cytotoxic triazine

ACTION: Alkylates DNA, RNA; inhibits DNA, RNA synthesis; also responsible for breakage, cross-linking of DNA strands; activity is not cell-cycle–phase specific

USES: Hodgkin's disease, malignant melanoma

Unlabeled uses: Malignant pheochromocytoma in combination with cyclophosphamide and vinCRIStine, metastatic soft-tissue sarcoma in combination with other agents, carcinoma meningitis, neuroblastoma

CONTRAINDICATIONS: Breastfeeding, hypersensitivity

Precautions: Renal disease

Black Box Warning: Pregnancy (C) 1st trimester, radiation therapy, hepatic disease, bone marrow suppression, secondary malignancy

DOSAGE AND ROUTES

Metastatic malignant melanoma

• **Adult: IV** 2-4.5 mg/kg/day × 10 days or 100-250 mg/m²/day × 5 days; repeat q3-4wk depending on response

Hodgkin's disease

• **Adult: IV** 150 mg/m²/day × 5 days with other agents, repeat q4wk; or 375 mg/m² on days 1 and 15 when given in combination, repeat q28days

Osteogenic sarcoma (unlabeled)

• **Adult and child: IV** 250 mg/m²/day as continuous inf × 4 days q28days

Soft-tissue sarcoma (unlabeled)

• **Adult and child: IV** 250-300 mg/m²/day as continuous inf × 3 days q21-28days

Carcinoma meningitis (unlabeled)

• **Adult: INTRATHECAL** 5-30 mg in a fixed dose 2-3 ×/wk until disease controlled

Available forms: Powder for inj 10, 100, 200 mg

Administer:

• Antiemetic 30-60 min before giving product to prevent vomiting, nausea; vomiting may subside after several doses

• Antibiotics for prophylaxis of infection

IV route

• Use cytotoxic handling precautions

Direct IV route

• After diluting 100 mg/9.9 or 200 mg/19.7 ml of sterile water for inj (10 mg/ml), give by direct IV over 1 min through Y-tube or 3-way stopcock

Intermittent IV INF route

• May be further diluted in 50-250 ml D_5W or NS for inj, given as an inf over ½ hr

• Watch for extravasation; stop infusion, apply ice to area

Y-site compatibilities: Amifostine, anidulafungin, atenolol, aztreonam, bivalirudin, bleomycin, caspofungin, DAPTOmycin, dexmedetomidine, DOCEtaxel, DOXOrubicin, ertapenem, etoposide, fenoldopam, filgrastim, fludarabine, gemtuzumab, granisetron, levofloxacin, mechlorethamine, melphalan, nesiritide, octreotide, ondansetron, oxaliplatin, PACLitaxel, palonosetron, pamidronate, quinupristin-dalfopristin, sargramostim, teniposide, thiotepa, tigecycline, tirofiban, vinorelbine, voriconazole, zoledronic acid

SIDE EFFECTS

CNS: Facial paresthesia, flushing, fever, malaise; confusion, headache, seizures, cerebral hemorrhage, blurred vision (high doses)

GI: *Nausea, anorexia, vomiting,* hepatotoxicity (rare)

HEMA: Thrombocytopenia, leukopenia, anemia

INTEG: *Alopecia,* dermatitis, pain at inj site, photosensitivity; severe sun reactions (high doses)

MISC: Flulike symptoms, malaise, fever, myalgia, hypotension

SYST: Anaphylaxis

PHARMACOKINETICS

Metabolized by liver; excreted in urine; half-life 35 min, terminal 5 hr, 5% protein bound

INTERACTIONS

Black Box Warning: Toxicity, bone marrow suppression: bone marrow suppressants, radiation, other antineoplastics

• Bleeding: salicylates, anticoagulants

Increase: adverse reaction; decrease antibody reaction—live virus vaccines
Increase: nephrotoxicity—aminoglycosides
Increase: ototoxicity—loop diuretics
Decrease: dacarbazine effect—phenytoin, PHENobarbital

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Bone marrow suppression: CBC, differential, platelet count weekly; notify prescriber of results

• Monitor temp; may indicate beginning infection

Black Box Warning: Secondary malignancy: assess for secondary malignancy that may occur with this product

• Bleeding: hematuria, guaiac, bruising, petechiae of mucosa or orifices q8hr
• Effects of alopecia on body image, discuss feelings about body changes

Black Box Warning: Hepatic disease: jaundice of skin, sclera; dark urine; clay-colored stools; itchy skin; abdominal pain; fever; diarrhea; hepatic studies before, during therapy (bilirubin, AST, ALT, LDH) as needed or monthly

• Inflammation of mucosa, breaks in skin

⚠ Hypersensitivity reactions, anaphylaxis, discontinue product, administer meds for anaphylaxis

Perform/provide:

• Storage in light-resistant container in a dry area
• Increased fluid intake to 2-3 L/day to prevent urate deposits, calculi formation
• Warm compresses at inf site for inflammation

Evaluate:

• Therapeutic response: decreased tumor size, spread of malignancy

Teach patient/family:

• That patient should avoid prolonged exposure to sun, wear sunscreen
• That hair may be lost during treatment; that a wig or hairpiece may make the patient feel better; that new hair may be different in color, texture
• To report signs of **infection:** fever, sore throat, flulike symptoms
• To report signs of **anemia:** fatigue, headache, faintness, SOB, irritability
• To report bleeding; to avoid use of razors, commercial mouthwash
• **Pregnancy:** to notify prescriber if pregnancy is planned or suspected pregnancy (D)
• To avoid aspirin products or ibuprofen

Black Box Warning: To use reliable contraceptives during and for several months after therapy; not to breastfeed

D

dalfampridine (Rx)

(dal-fam'pri-deen)

Ampyra

Func. class.: Neurological agent—MS
Chem. class.: Broad spectrum potassium channel blocker

ACTION: Mechanism of action is not fully understood; a broad-spectrum potassium channel blocker that inhibits potassium channels and increased action potential conduction in demyelinated axions

USES: For improved walking in patients with multiple sclerosis

CONTRAINDICATIONS: Renal failure (CCr <50 ml/min), seizures
Precautions: Pregnancy (C), breastfeeding, geriatric patients, renal disease

DOSAGE AND ROUTES

• **Adult: PO** 10 mg q12hr
Renal dose
• **Adult: PO** CCr 51-80 ml/min, no dosage adjustment needed but seizure risk unknown; CCr ≤50 ml/min, do not use
Available forms: Ext rel tab 10 mg
Administer:
• Do not break, crush, or chew; give without regard to meals

- Do not give closer together than q12hr; seizures may occur
- Do not double doses; if a dose is missed, skip it

SIDE EFFECTS

CNS: Seizures, paresthesias, headache, dizziness, asthenia, insomnia
GI: Nausea, constipation, dyspepsia
GU: Urinary tract infection
MS: Back pain

PHARMACOKINETICS

Bioavailability 96%; peak 3-4 hr (fasting), longer if taken with food; largely unbound to plasma proteins; 96% recovered in urine

INTERACTIONS

- Do not use with fampridine, other 4-aminopyridine (4-AP)–containing products

NURSING CONSIDERATIONS

Assess:
- **Multiple sclerosis:** improved walking, including speed
- **Seizures:** more common in those with previous seizure disorder

Evaluate:
- Therapeutic response: ability to walk at improved speed in MS

Teach patient/family:
- To notify prescriber if pregnancy is planned or suspected; not to breastfeed
- Expected results; side effects, including seizures

⚠ HIGH ALERT

dalteparin (Rx)

(dahl'ta-pear-in)

Fragmin

Func. class.: Anticoagulant
Chem. class.: Low-molecular-weight heparin

ACTION: Inhibits factor Xa/IIa (thrombin), resulting in anticoagulation

USES: Unstable angina/non–Q-wave MI; prevention of deep venous thrombosis in abdominal surgery, hip replacement, or in those with restricted mobility during acute illness, PE
Unlabeled uses: Antiphospholipid antibody, arterial thromboembolism (after heart valve surgery), cerebral thromboembolism

CONTRAINDICATIONS: Hypersensitivity to this product, heparin, or pork products, benzyl alcohol; active major bleeding, hemophilia, leukemia with bleeding, thrombocytopenic purpura, cerebrovascular hemorrhage, cerebral aneurysm; those undergoing regional anesthesia for unstable angina, non–Q-wave MI, dalteparin-induced thrombocytopenia
Precautions: Pregnancy (B), breastfeeding, children, recent childbirth, geriatric patients; hepatic disease; severe renal disease; blood dyscrasias; bacterial endocarditis; acute nephritis; uncontrolled hypertension; recent brain, spine, eye surgery; congenital or acquired disorders; severe cardiac disease; peptic ulcer disease; hemorrhagic stroke; history of HIT; pericarditis; pericardial effusion; recent lumbar puncture; vasculitis; other diseases in which bleeding is possible
Black Box Warning: Epidural anesthesia

DOSAGE AND ROUTES

Hip replacement surgery/DVT prophylaxis

• **Adult: SUBCUT** 2500 international units 2 hr before surgery and 2nd dose in the evening on the day of surgery (4-8 hr postop), then 5000 international units **SUBCUT** 1st postop day and daily × 5-10 days

Unstable angina/non–Q-wave MI

• **Adult: SUBCUT** 120 international units/kg q12hr × 5-8 days, max 10,000 international units q12hr × 5-8 days with concurrent aspirin; continue until stable

DVT, prophylaxis for abdominal surgery

• **Adult: SUBCUT** 2500 international units 1-2 hr before surgery; repeat daily × 5-10 days; for high-risk patients, 5000 international units should be used

DVT/pulmonary embolism in cancer patients

• **Adult: SUBCUT** 200 international units/kg daily during 1st month (max single dose 18,000 international units), then 150 international units/kg daily for months 2-6 (max single dose 18,000 international units), use prefilled syringe that is closest to calculated dose; if platelets are 50,000-100,000/mm^3, reduce dose by 2500 international units until platelets ≥100,000 mm^3; if platelets <50,000/mm^3, discontinue until >50,000/mm^3

Renal dose

• **Adult: SUBCUT** cancer patient with CCr <30 ml/min, monitor anti-factor Xa during extended treatment

APLA (unlabeled)

• **Adult (female): SUBCUT** Antepartum 5000 international units/day with aspirin; maintain anti-factor Xa of 0.2-0.6 international units/ml

Arterial thromboembolism prophylaxis (unlabeled)

• **Adult: SUBCUT** LMWH in combination with oral anticoagulants until INR is in therapeutic range × 2 consecutive days

Available forms: Prefilled syringes, 2500, 5000 international units/0.2 ml; 7500 international units/0.3 ml; 10,000, 25,000 international units/ml

Administer:

• Cannot be used interchangeably (unit for unit) with unfractionated heparin or other LMWHs

• Do not give IM or IV product route; approved is SUBCUT only; do not mix with other inj or sol

• Have patient sit or lie down; SUBCUT inj may be 2 inches from umbilicus in a U-shape, upper outer side of thigh, around navel, or upper outer quadrangle of the buttocks; rotate inj sites

• Changing needles not recommended; change inj site daily; use at same time of day

SIDE EFFECTS

CNS: Intracranial bleeding
HEMA: Thrombocytopenia
INTEG: Pruritus, superficial wound infection, skin necrosis, inj site reaction
SYST: Hypersensitivity, hemorrhage, anaphylaxis possible, hematoma

PHARMACOKINETICS

87% absorbed, excreted by kidneys, elimination half-life 3-5 hr, peak 4 hr, onset 1-2 hr, duration >12 hr

INTERACTIONS

Increase: bleeding risk—aspirin, oral anticoagulants, platelet inhibitors, NSAIDs, salicylates, thrombolytics

Drug/Lab Test

Increase: AST, ALT

NURSING CONSIDERATIONS

Assess:

• Blood studies (Hct/Hgb, CBC, platelets, anti-Xa, stool guaiac) during treatment because bleeding can occur

⚠ **Bleeding:** Bleeding gums, petechiae, ecchymosis, black tarry stools, hematuria, epistaxis, decrease in Hct, B/P; may indicate bleeding, possible hemorrhage; notify prescriber immediately, product should be discontinued

Black Box Warning: Epidural anesthesia: Neurologic impairment frequently in those when neuraxial anesthesia has been used, spinal/epidural hematomas can occur, with paralysis

- **Hypersensitivity:** fever, skin rash, urticaria; notify prescriber immediately
- Needed dosage change q1-2wk; dose may need to be decreased if bleeding occurs

Evaluate:

- Therapeutic response: absence of DVT

Teach patient/family:

- To avoid OTC preparations that contain aspirin; other anticoagulants, serious product interaction may occur unless approved by prescriber
- To use soft-bristle toothbrush to avoid bleeding gums; to avoid contact sports; use electric razor; to avoid IM inj
- To report any signs of bleeding (gums, under skin, urine, stools), unusual bruising

TREATMENT OF OVERDOSE:

Protamine sulfate 1% given IV; 1 mg protamine/100 anti-Xa international units of dalteparin given

dantrolene (Rx)

(dan'troe-leen)

Dantrium, Revonto

Func. class.: Skeletal muscle relaxant, direct acting

Chem. class.: Hydantoin

Do not confuse:
Dantrium/danazol

ACTION:

Interferes with intracellular release of calcium from the sarcoplasmic reticulum necessary to initiate contraction; slows catabolism in malignant hyperthermia

USES:

Spasticity in multiple sclerosis, stroke, spinal cord injury, cerebral palsy, malignant hyperthermia

Unlabeled uses: Neuroleptic malignant syndrome

CONTRAINDICATIONS:

Hypersensitivity, compromised pulmonary function, impaired myocardial function

Black Box Warning: Active hepatic disease

Precautions: Pregnancy (C), breastfeeding, geriatric patients, peptic ulcer disease, cardiac/renal/hepatic disease, stroke, seizure disorder, diabetes mellitus, ALS, COPD, MS, mannitol/gelatin hypersensitivity, labor, lactase deficiency, extravasation

Black Box Warning: Females >35 yr, with MS, or taking estrogens

DOSAGE AND ROUTES

Spasticity

- **Adult: PO** 25 mg/day; may increase to 25-100 mg bid-qid, max 400 mg/day
- **Child: PO** 0.5 mg/kg/day given in divided doses bid; dosage may increase gradually, max 400 mg/day

Prevention of malignant hyperthermia

- **Adult and child: PO** 4-8 mg/kg/day in 3-4 divided doses × 1-2 days prior to procedure, give last dose 4 hr preop; **IV** 2.5 mg/kg before anesthesia

Malignant hyperthermia

- **Adult and child: IV** 1-2.5 mg/kg, may repeat to total dose of 10 mg/kg; **PO** 4-8 mg/kg/day in 4 divided doses × 1-3 days

Neuroleptic malignant syndrome (unlabeled)

- **Adult: PO** 100-300 mg/day in divided doses; **IV** 1.25-1.5 mg/kg

Available forms: Caps 25, 50, 100 mg; powder for inj 20 mg/vial

Administer:
- Avoid use with other CNS depressants

PO route
- Do not crush or chew caps
- Caps may be opened, mixed with juice and swallowed
- With meals for GI symptoms

IV route
- IV after diluting 20 mg/60 ml sterile water for inj without bacteriostatic agent (333 mcg/ml); shake until clear; give by rapid IV push through Y-tube or 3-way stopcock; follow with prescribed doses immediately; may also give by intermittent inf over 1 hr before anesthesia
- Considered incompatible in sol or syringe; compatibility unknown
- Storage in tight container at room temp; protect diluted sol from light, use reconstituted sol within 6 hr

SIDE EFFECTS

CNS: *Dizziness, weakness, fatigue, drowsiness,* headache, disorientation, insomnia, paresthesias, tremors, seizures
CV: Hypotension, chest pain, palpitations
EENT: Nasal congestion, blurred vision, mydriasis
GI: Hepatic injury, *nausea,* constipation, vomiting, increased AST, alk phos, abdominal pain, dry mouth, anorexia, hepatitis, dyspepsia
GU: Urinary frequency, nocturia, impotence, crystalluria, hepatitis
HEMA: Eosinophilia, aplastic anemia, leukopenia, thrombocytopenia/lymphoma
INTEG: Rash, pruritus, photosensitivity, extravasation (tissue necrosis)
RESP: Pleural effusion, pulmonary edema

PHARMACOKINETICS

PO: Peak 5 hr, highly protein bound, half-life 8 hr, metabolized in liver, excreted in urine (metabolites), absorption poor (35%)

INTERACTIONS

Increase: dysrhythmias—verapamil
Increase: hepatotoxicity—estrogens, other hepatotoxics
Increase: CNS depression—alcohol, tricyclics, opiates, barbiturates, sedatives, hypnotics, antihistamines

D

NURSING CONSIDERATIONS

Assess:
- **Seizures:** increased seizure activity, ECG in epilepsy patient; poor seizure control has occurred
- I&O ratio; check for urinary retention, frequency, hesitancy, especially geriatric patients

Black Box Warning: Active hepatic disease: hepatic function by frequent determination of AST, ALT, bilirubin, alk phos, GGTP; renal function studies, BUN, creatinine, CBC

- **Allergic reactions:** rash, fever, respiratory distress
- Severe weakness, numbness in extremities; prescriber should be notified and product discontinued
- Tolerance: increased need/more frequent requests for medication, increased pain
- CNS depression: dizziness, drowsiness, insomnia, psychiatric symptoms

⚠ **Signs of hepatotoxicity:** jaundice, yellow sclera, pain in abdomen, nausea, fever; prescriber should be notified, product discontinued

Evaluate:
- Therapeutic response: decreased pain, spasticity

Teach patient/family:
- Not to discontinue medication quickly because hallucinations, spasticity, tachycardia will occur; product should be tapered off over 1-2 wk; to notify prescriber of abdominal pain, jaundiced sclera, clay-colored stools, change in color of urine
- That if improvement does not occur within 6 wk, prescriber may discontinue product
- To avoid hazardous activities if drowsiness, dizziness occurs

- To avoid using OTC medications: cough preparations, antihistamines, other CNS depressants, alcohol unless directed by prescriber
- To use sunscreen or stay out of the sun to prevent burns

TREATMENT OF OVERDOSE:

Activated charcoal, supportive care

dapiprazole ophthalmic

See Appendix B

DAPTOmycin (Rx)

(dap'toe-mye-sin)

Cubicin

Func. class.: Antiinfective—miscellaneous

Chem. class.: Lipopeptides

ACTION: A new class of antiinfective; it binds to the bacterial membrane and results in a rapid depolarization of the membrane potential, thereby leading to inhibition of DNA, RNA, and protein synthesis

USES: Complicated skin, skin-structure infections caused by *Staphylococcus aureus* including methicillin-resistant strains, *Streptococcus pyogenes, Streptococcus agalactiae, Streptococcus dysgalactiae, Enterococcus faecalis* (vancomycin-susceptible strains)

Unlabeled uses: Bacteremia, endocarditis, UTI, vancomycin-resistant enterococci (VRE), *Corynebacterium jeikeium, Staphylococcus haemolyticus, Enterococcus facium*

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (B), breast-feeding, children, geriatric patients, GI/renal disease, myopathy, ulcerative/pseudomembranous colitis, rhabdomyolysis, eosinophilic pneumonia

DOSAGE AND ROUTES

- **Adult: IV INF** 4 mg/kg over ½ hr diluted in 0.9% NaCl, give q24hr × 7-14 days; some indications may use up to 6 mg/kg
- **Adolescent/child/infant ≥5 mo (unlabeled): IV** 4-6 mg/kg/day

Renal dose

- **Adult: IV INF** CCr <30 ml/min, hemodialysis, CAPD 4 mg/kg q48hr

Bacteremia, endocarditis, UTI (unlabeled)

- **Adult: IV** 6 mg/kg/day

VRE (unlabeled)

- **Adult: IV** 4 mg/kg/day

Available forms: Lyophilized powder for inj 500 mg

Administer:

IV route

- After reconstitution with 5 ml 0.9% NaCl (250 mg/5 ml) or 10 ml 0.9% NaCl (500 mg/10 ml); further dilution is needed with 0.9 NaCl; infuse over ½ hr or give reconstituted sol (50 mg/ml) by IV inj over 2 min, do not use dextrose-containing solutions

Y-site compatibilities: Alfentanil, amifostine, amikacin, aminocaproic acid, aminophylline, amiodarone, amphotericin B liposome, ampicillin, ampicillin-sulbactam, argatroban, arsenic trioxide, atenolol, atracurium, azithromycin, aztreonam, bivalirudin, bleomycin, bumetanide, buprenorphine, busulfan, butorphanol, calcium chloride/gluconate, CARBOplatin, carmustine, caspofungin, ceFAZolin, cefepime, cefotaxime, cefoTEtan, cefOXitin, ceftAZidime, ceftizoxime, ceftRIAXone, cefuroxime, chloramphenicol, chlorproMAZINE, cimetidine, ciprofloxacin, cisatracurium, CISplatin, clindamycin, cyclophosphamide, cycloSPORINE, dacarbazine, DACTINomycin, DAUNOrubicin, dexamethasone, dexmedetomidine, dexrazoxane, diazepam, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, dolasetron, DOPamine, doripenem, doxacurium, DOXOrubicin, DOXOrubicin liposomal, doxycycline, droperidol, enalaprilat, ePHEDrine, EPI-

NEPHrine, epirubicin, eptifibatide, ertapenem, erythromycin, esmolol, etoposide, famotidine, fenoldopam, fentaNYL, fluconazole, fludarabine, fluorouracil, foscarnet, fosphenytoin, furosemide, ganciclovir, gentamicin, glycopyrrolate, granisetron, haloperidol, heparin, hydrALAZINE, hydrocortisone, HYDROmorphone, hydrOXYzine, IDArubicin, ifosfamide, inamrinone, insulin (regular), irinotecan, isoproterenol, ketorolac, labetalol, leucovorin, levofloxacin, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, melphalan, meperidine, meropenem, mesna, metaraminol, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, midazolam, milrinone, mitoXANtrone, mivacurium, morphine, moxifloxacin, mycophenolate mofetil, nafcillin, nalbuphine, naloxone, niCARdipine, nitroprusside, norepinephrine, octreotide, ondansetron, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pamidronate, pancuronium, PEMEtrexed, pentamidine, PHENobarbital, phenylephrine, piperacillin-tazobactam, polymyxin B, potassium acetate/chloride/phosphates, procainamide, prochlorperazine, promethazine, propranolol, quinupristin-dalfopristin, ranitidine, rocuronium, sodium acetate/bicarbonate/citrate/phosphates, succinylcholine, sulfamethoxazole-trimethoprim, tacrolimus, teniposide, theophylline, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, tobramycin, topotecan, trimethobenzamide, vasopressin, vecuronium, verapamil, vinBLAStine, vinCRIStine, vinorelbine, voriconazole, zidovudine, zoledronic acid

Solution compatibilities: 0.9% NaCl, LR

SIDE EFFECTS

CNS: Headache, insomnia, dizziness, confusion, anxiety, fatigue, fever

CV: Hypo/hypertension, heart failure, chest pain

GI: Nausea, constipation, diarrhea, vomiting, dyspepsia, pseudomembranous colitis, abdominal pain

GU: Nephrotoxicity

HEMA: Leukocytosis, anemia, thrombocytopenia

INTEG: Rash, pruritus

MISC: Fungal infections, UTI, anemia, hypoglycemia

MS: Muscle pain or weakness, arthralgia, pain, myopathy

RESP: Cough, eosinophilic pneumonia

SYST: Anaphylaxis

PHARMACOKINETICS

Site of metabolism unknown, protein binding 92%, terminal half-life 8-9 hr, 78% excreted unchanged (urine), breast milk

INTERACTIONS

Increase: myopathy—HMG-CoA reductase inhibitors

Drug/Lab Test

Increase: CPK, AST, ALT, BUN, creatinine, albumin

Increase/Decrease: glucose

NURSING CONSIDERATIONS

Assess:

- **Eosinophilic pneumonia:** dyspnea, fever, cough, shortness of breath; if left untreated, can lead to respiratory failure and death
- ⚠ **Nephrotoxicity:** any patient with compromised renal system, toxicity may occur; BUN, creatinine
- I&O ratio: report hematuria, oliguria, nephrotoxicity may occur
- Blood studies: CBC, CPK
- C&S; product may be given as soon as culture taken
- B/P during administration; hypo/hypertension may occur
- Signs of infection
- Allergies before treatment, reaction of each medication

Evaluate:

- **Myopathy:** assess for muscle pain, weakness; CPK >10× ULN; symptoms resolve after 3 days and CPK return to normal within 7-10 days after stopping product

- **Pseudomembranous colitis:** assess for diarrhea with mucous, pus, product should be discontinued; if moderate to severe, provide fluids, electrolytes, protein supplements, and an antibacterial
- Therapeutic response: negative culture

Teach patient/family:

- About allergies before treatment, reaction to each medication
- To report sore throat, fever, fatigue; could indicate superinfection; diarrhea; muscle weakness, pain
- Avoid breastfeeding

darbepoetin (Rx)

(dar'bee-poh'eh-tin)

Aranesp

Func. class.: Hematopoietic agent

Chem. class.: Recombinant human erythropoietin

ACTION: Stimulates erythropoiesis by the same mechanism as endogenous erythropoietin; in response to hypoxia, erythropoietin is produced in the kidney and released into the bloodstream, where it interacts with progenitor stem cells to increase red-cell production

USES: Anemia associated with chronic renal failure, in patients on and not on dialysis, and anemia in nonmyeloid malignancies for patients receiving coadministered chemotherapy

CONTRAINDICATIONS: Hypersensitivity to mammalian-cell–derived products, human albumin, polysorbate 80; uncontrolled hypertension; red-cell aplasia

Precautions: Pregnancy (C), breastfeeding, children, seizure disorder, porphyria, hypertension, sickle cell disease; vit B_{12}, folate deficiency; chronic renal failure, dialysis; latex hypersensitivity, CABG, angina, anemia

Black Box Warning: Hgb >12 g/dl, neoplastic disease

DOSAGE AND ROUTES

Correction of anemia in chronic renal failure

- **Adult: SUBCUT/IV** 0.45 mcg/kg as a single inj; every week, titrate max target Hgb of 12 g/dl

Chemotherapy treatment

- **Adult: SUBCUT** 2.25 mcg/kg/wk or 500 mcg q3wk

Epoetin alfa to darbepoetin conversion

- **Adult: SUBCUT/IV** (epoetin alfa <2500 units/wk) 6.25 mcg/wk; (epoetin alfa 2500-4999 units/wk) 12.5 mcg/wk; (epoetin alfa 5000-10,999 units/wk) 25 mcg/wk; (epoetin alfa 11,000-17,999 units/wk) 40 mcg/wk; (epoetin alfa 18,000-33,999 units/wk) 60 mcg/wk; (epoetin alfa 34,000-89,999 units/wk) 100 mcg/wk; (epoetin alfa >90,000 units/wk) 200 mcg/wk

Available forms: Sol for inj 25, 40, 60, 100, 150, 200, 300, 500 mcg/ml

Administer:

SUBCUT/IV route

- Without shaking; check for discoloration, particulate matter, do not use if present; do not dilute, do not mix with other products or sol, discard unused portion, do not pool unused portions
- Subcut typically used for those not requiring dialysis
- IV given direct undiluted or bolus into IV tubing or venous line after completion of dialysis; watch for clotting of line
- Adjust dosage every month or more
- Store refrigerated, do not freeze; protect from light

SIDE EFFECTS

CNS: Seizures, sweating, headache, dizziness, stroke

CV: *Hypo/hypertension,* cardiac arrest, *angina pectoris,* thrombosis, CHF, acute MI, dysrhythmias, chest pain, transient ischemic attacks, edema

GI: *Diarrhea, vomiting, nausea, abdominal pain, constipation*

HEMA: Red-cell aplasia

MISC: *Infection, fatigue, fever,* death, *fluid overload,* vascular access hemorrhage, dehydration, sepsis
MS: *Bone pain, myalgia, limb pain, back pain*
RESP: *URI, dyspnea, cough, bronchitis,* PE
SYST: Allergic reactions, anaphylaxis

PHARMACOKINETICS

IV: Onset of increased reticulocyte count 2-6 wk; distributed to vascular space; absorption slow and rate limiting; terminal half-life 49 hr (SUBCUT), 21 hr (IV); peak concentration at 34 hr; increased Hgb levels not generally observed until 2-6 wk after treatment initiated

INTERACTIONS

⚠ Do not use epoetin alfa with product
Increase: darbepoetin-alfa effect—androgens
Drug/Lab Test
Increase: WBC, platelets
Decrease: bleeding time

NURSING CONSIDERATIONS

Assess:
• Symptoms of anemia: fatigue, dyspnea, pallor
⚠ **Serious allergic reactions:** rash, urticaria; if anaphylaxis occurs, stop product, administer emergency treatment (rare)
• Renal studies: urinalysis, protein, blood, BUN, creatinine; monitor dialysis shunts; during dialysis, heparin may need to be increased

Black Box Warning: Blood studies: ferritin, transferrin monthly; transferrin saturation ≥20%, ferritin ≥100 ng/ml; Hgb 2×/wk until stabilized in target range (30%-33%) then at regular intervals; those with endogenous erythropoietin levels of <500 units/L respond to this agent; iron stores should be corrected before beginning therapy, if there is lack of response, obtain folic acid, iron, B_{12} levels

Black Box Warning: Neoplastic disease: breast, non–small cell lung, head and neck, lymphoid, or cervical cancers, increased tumor progression, use lowest dose to avoid RBC transfusion

• B/P: check for rising B/P as Hgb rises; antihypertensives may be needed
⚠ CV status: hypertension may occur rapidly, leading to **hypertensive encephalopathy;** Hgb >12 g/dl may lead to death, do not administer
• I&O; report drop in output to <50 ml/hr
• **Seizures:** if Hgb is increased by 4 pts within 2 wk, institute seizure precautions
• CNS symptoms: sweating, pain in long bones
• **Dialysis patients:** thrill, bruit of shunts, monitor for circulation impairment

Evaluate:
• Therapeutic response: increase in reticulocyte count, Hgb/Hct; increased appetite, enhanced sense of well-being

Teach patient/family:
• To avoid driving or hazardous activity during beginning of treatment
• To monitor B/P, Hgb
• To take iron supplements, vit B_{12}, folic acid as directed
• To report side effects to prescriber; to comply with treatment regimen
• That menses and fertility may return; to use contraception
• About home administration procedures, if appropriate

darifenacin

(da-ree-fen'ah-sin)

Enablex

Func. class.: Antispasmodic/Guanticholinergic

ACTION: Bladder smooth muscle relaxation by decreasing the action of muscarinic receptors, thereby relieving overactive bladder

USES: Urge incontinence, frequency, urgency in overactive bladder

CONTRAINDICATIONS: Hypersensitivity, urinary retention, narrow-angle glaucoma (uncontrolled)
Precautions: Severe hepatic disease (Child-Pugh C), GI/GU obstruction, controlled narrow-angle glaucoma, ulcerative colitis, myasthenia gravis, moderate hepatic disease (Child-Pugh B), elderly

DOSAGE AND ROUTES

• **Adult: PO** 7.5 mg/day, initially, may increase to 15 mg/day after 14 days if needed
Those taking a CYP3A4 inhibitor
• **Adult: PO** max 7.5 mg/day
Hepatic dosage
• **Adult: PO** (Child-Pugh B) max 7.5 mg/day
Available forms: Tabs, ext rel 7.5, 15 mg
Administer:
• Without regard to meals, do not crush, break, chew extended-release tabs
• Store at room temperature

SIDE EFFECTS

CNS: Dizziness, headache
EENT: Blurred vision, drying eyes, sinusitis, rhinitis
GI: Constipation, dry mouth, abdominal pain, nausea, vomiting, dyspepsia
GU: UTI, urine retention, vaginosis
INTEG: rash, pruritus, skin drying
MISC: Bronchitis, flulike symptoms

PHARMACOKINETICS

Peak 7 hr, half-life 12-19 hr

INTERACTIONS

Increase: level of—digoxin
Increase: anticholinergic effect—anticholinergics
Increase: darifenacin level—CYP3A4 inhibitors
Increase: levels of—drugs metabolized by CYP2D6

NURSING CONSIDERATIONS

Assess:
• Urinary function: urgency, frequency, retention in bladder-outflow obstruction
• Constipation, may add bulk in the diet
Evaluate:
• Decreasing urgency, frequency of urination
Teach patient/family:
• To take without regard to meals; do not crush, break, chew extended-release tabs
• To store at room temperature
• To avoid breastfeeding; to notify prescriber if pregnancy (C) is planned or suspected
• About anticholinergic symptoms (dry mouth, constipation, dry eyes, heat prostration), not to become overheated
• To avoid hazardous activities until reaction is known, dizziness, blurred vision can occur

darunavir (Rx)

(dar-ue'na-vir)

Prezista

Func. class.: Antiretroviral
Chem. class.: Protease inhibitor

ACTION: Inhibits human immunodeficiency virus (HIV-1) protease; this prevents maturation of the virus

USES: HIV-1 in combination with ritonavir and other antiretrovirals

CONTRAINDICATIONS: Hypersensitivity
Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, renal/hepatic disease, history of renal stones, diabetes, hypercholesterolemia, sulfonamide hypersensitivity, antimicrobial resistance, bleeding, immune reconstitution syndrome, pancreatitis

DOSAGE AND ROUTES

Treatment-naive patients
• **Adult: PO** 800 mg with ritonavir 100 mg daily

Treatment-experienced patients

- **Adult/adolescent >40 kg/child ≥6 yr: PO** 600 mg bid; with ritonavir 100 mg bid with food; 800 mg daily with ritonavir 100 mg with food (without darunavir resistance)
- **Adolescent ≥30 kg, <40 kg and child ≥6 yr: PO** 450 mg bid with ritonavir 60 mg bid
- **Adolescent ≥20 kg, <30 kg and child ≥6 yr: PO** 375 mg bid with ritonavir 50 mg bid
- **Child 3 to <6 yr (14 kg to <15 kg: PO** 280 mg (with ritonavir 48 mg) bid with food
- **Child 3 to <6 yr (13 kg to <14 kg: PO** 260 mg (with ritonavir 40 mg) bid with food
- **Child 3 to <6 yr (12 kg to <13 kg: PO** 240 mg (with ritonavir 40 mg) bid with food
- **Child 3 to <6 yr (11 kg to <12 kg: PO** 220 mg (with ritonavir 32 mg) bid with food
- **Child 3 to <6 yr (10 kg to <11 kg: PO** 200 mg (with ritonavir 32 mg) bid with food

Available forms: Tabs 75, 150, 400, 600 mg

Administer:

- With food and ritonavir
- Tab should be swallowed whole

SIDE EFFECTS

CNS: *Headache, insomnia,* dizziness, somnolence

GI: *Diarrhea, abdominal pain, nausea, vomiting,* anorexia, dry mouth, hepatitis, hepatotoxicity

GU: Nephrolithiasis

INTEG: Rash, angioedema, Stevens-Johnson syndrome, toxic epidermal necrolysis, exanthematous pustulosis

MS: Pain

OTHER: Asthenia, insulin-resistant hyperglycemia, hyperlipidemia, ketoacidosis, lipodystrophy

PHARMACOKINETICS

95% protein binding; metabolized by CYP3A; peak 2.5-4 hr; terminal half-life 15 hr; excreted in feces 79.5%, urine 13.9%

INTERACTIONS

⚠ Life-threatening dysrhythmias: ergots, midazolam, rifampin, pimozide, triazolam; do not use concurrently

Increase: myopathy, rhabdomyolysis—HMG-CoA reductase inhibitors (atorvastatin, lovastatin, simvastatin)

Increase: darunavir levels—CYP3A4 inhibitors: (ketoconazole, itraconazole)

Increase: levels of both products—clarithromycin, zidovudine

Increase: levels of telapravir, rilpivarine, monitor for adverse reactions

Decrease: darunavir levels—CYP3A4 inducers (carBAMazepine, phenytoin, fosphenytoin, PHENobarbital), rifamycins, fluconazole, nevirapine, efavirenz

Decrease: levels of oral contraceptives

Decrease: levels of both products—tenofovir, avoid concurrent use

Drug/Herb

Decrease: darunavir levels—St. John's wort; avoid concurrent use

Increase: myopathy, rhabdomyolysis risk—red yeast rice

Drug/Food

Increase: darunavir absorption

Drug/Lab Test

Increase: LFTs, bilirubin, uric acid

Decrease: WBC, neutrophils, platelets

NURSING CONSIDERATIONS

Assess:

- Complaints of lower back, flank pain; indicates kidney stones
- Signs of infection, anemia, the presence of other sexually transmitted diseases
- **Serious skin reactions:** angioedema, Stevens-Johnson syndrome, toxic epidermal necrolysis; discontinue immediately, notify prescriber
- **Hepatoxicity:** hepatic studies (ALT, AST, bilirubin, amylase); all may be elevated in those with underlying liver disease, product should be discontinued in those with increased LFTs

• Viral load, CD4, HIV RNA during treatment
• Bowel pattern before, during treatment; if severe abdominal pain with bleeding occurs, product should be discontinued; monitor hydration
• **Hyperlipidemia:** cholesterol, triglycerides, LDL may be elevated; monitor serum cholesterol, lipid panel throughout treatment

Evaluate:
• Therapeutic response: decreased viral load, increased CD4 count

Teach patient/family:
• To use nonhormonal birth control; not to breastfeed
• To take as prescribed; if dose is missed, to take as soon as remembered up to 1 hr before next dose; not to double dose
• That product must be taken at same time of day to maintain blood levels for duration of therapy
⚠ That **hyperglycemia** may occur; watch for increased thirst, weight loss, hunger, dry, itchy skin; to notify prescriber if these occur
• To increase fluids to prevent kidney stones; if stone formation occurs, that treatment may need to be interrupted
• That product does not cure AIDS, only controls symptoms; not to donate blood; not to share; to notify all health care providers of use; not to use with any other products without prescriber's approval

dasatinib (Rx)

(da-si'ti-nib)

Sprycel

Func. class.: Antineoplastic—miscellaneous

Chem. class.: Protein-tyrosine kinase inhibitor

ACTION: Inhibits a tyrosine kinase enzyme, thereby reducing cell growth in leukemia

USES: Treatment of accelerated, chronic blast phase CML or acute lymphoblastic leukemia (ALL); chronic phase CML with resistance or intolerance to prior therapy; Philadelphia chromosome–positive CML in chronic phase

CONTRAINDICATIONS: Pregnancy (D), hypersensitivity

Precautions: Breastfeeding, children, geriatric patients, QT prolongation, infection, thrombocytopenia, accidental exposure, edema, infertility, lactase deficiency, neutropenia, anemia, autoimmune disease with immune reconstitution syndrome

DOSAGE AND ROUTES

Accelerated or myeloid/lymphoid blast phase CML with resistance/intolerance to prior therapy
• **Adult: PO** 140 mg daily titrated up to 180 mg daily in those resistant to therapy

Chronic phase CML with resistance/intolerance to prior therapy
• **Adult: PO** 100 mg daily either AM or PM

Dosage reduction for those taking a strong CYP3A4 inhibitor
• **Adult: PO** 20-40 mg daily

Available forms: Tabs 20, 50, 70, 80, 100 mg

Administer:
• Do not break, crush, or chew tab
• After meal and with large glass of water

SIDE EFFECTS

CNS: CNS hemorrhage, headache, dizziness, insomnia, neuropathy, asthenia
CV: Dysrhythmias, chest pain, CHF, pericardial effusion, congestive cardiomyopathy, decreased injection fraction, QT prolongation
GI: *Nausea,* vomiting, *anorexia, abdominal pain,* constipation, diarrhea, GI bleeding, muscositis, stomatitis
HEMA: Neutropenia, thrombocytopenia, bleeding
INTEG: *Rash, pruritus,* alopecia
META: Fluid retention, edema, hypocalcemia, hypophosphatemia
MISC: Increased/decreased weight

MS: Pain, arthralgia, myalgia
RESP: Cough, dyspnea, pulmonary edema/hypertension, pneumonia, upper respiratory tract infection, pleural effusion

PHARMACOKINETICS

Metabolized by CYP3A4; 96% protein bound; peak 0.5-6 hr; excreted in feces (85%), small amount in urine (4%); terminal half-life 1.3-5 hr

INTERACTIONS

• Altered action of CYP3A4 substrates: alfentanil, cycloSPORINE, ergots, fentaNYL, pimozide, quiNIDine, sirolimus, tacrolimus

Increase: dasatinib concentrations—CYP3A4 inhibitors: ketoconazole, itraconazole, erythromycin, clarithromycin, nefazodone, protease inhibitors, telithromycin

Increase: myopathy, rhabdomyolysis—HMG-CoA reductase inhibitors (rare)

Increase: plasma concentrations of simvastatin

Increase: QT prolongation—class IA/III antidysrhythmics and other products that increase QT prolongation

Decrease: dasatinib concentrations—CYP3A4 inducers (dexamethasone, phenytoin, carBAMazepine, rifampin, PHENObarbital), H_2 blockers (famotidine), proton pump inhibitors (omeprazole)

Drug/Food

• Grapefruit: do not use

Drug/Herb

Decrease: dasatinib concentration—St. John's wort

NURSING CONSIDERATIONS

Assess:

• **Myelosuppression:** ANC, platelets; in chronic phase, if ANC $<1 \times 10^9$/L and/or platelets $<50 \times 10^9$/L, stop until ANC $\geq 1.5 \times 10^9$/L and platelets $>75 \times 10^9$/L; in accelerated phase/blast crisis, if ANC $<0.5 \times 10^9$/L and/or platelets $<10 \times 10^9$/L, determine whether cytopenia is related to biopsy/aspirate, if not, reduce dose by 200 mg, if cytopenia continues, reduce dose by another 100 mg; if cytopenia continues for 4 wk, stop product until ANC $\geq 1 \times 10^9$/L, monitor CBC weekly × 8 wk, then monthly

• **Hepatotoxicity:** monitor LFTs before treatment and monthly; if liver transaminases $>5 \times$ IULN, withhold until transaminase levels return to $<2.5 \times$ IULN

• **Signs of fluid retention, edema:** weigh, monitor lung sounds, assess for edema; some fluid retention is dose dependent, may result in CHF, congestive cardiomyopathy, decreased injection failure

• **QT Prolongation:** more common in those with hypokalemia, hypomagnesemia, congenital long QT syndrome, those taking products that prolong QT; correct electrolyte imbalances before use

Evaluate:

• Therapeutic response: decrease in leukemic cells or size of tumor

Teach patient/family:

• To report adverse reactions immediately: SOB, swelling of extremities, bleeding, bruising

• About reason for treatment, expected results

• To use contraception (pregnancy category D), to avoid breastfeeding; men should use condoms

• To take at same time of day, not to crush or chew, do not use grapefruit juice

⚠ HIGH ALERT

DAUNOrubicin (Rx)

(daw-noe-roo'bi-sin)

Cerubidine

DAUNOrubicin citrate liposomal (Rx)

DaunoXome

Func. class.: Antineoplastic, antibiotic
Chem. class.: Anthracycline glycoside

Do not confuse:
DAUNOrubicin/DOXOrubicin

ACTION: Inhibits DNA synthesis, primarily; derived from *Streptomyces coerulorubidus;* replication is decreased by binding to DNA, which causes strand splitting; cell-cycle specific (S phase); a vesicant

USES: Acute lymphocytic leukemia (ALL), acute myelogenous leukemia (AML); *liposomal:* Kaposi's sarcoma
Unlabeled uses: *Liposomal:* multiple myeloma, AML, breast cancer, non-Hodgkin's lymphoma

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, hypersensitivity, systemic infections, cardiac disease, bone marrow depression

Black Box Warning: IM/SUBCUT use

Precautions: Tumor lysis syndrome, MI, infection, thrombocytopenia, renal/hepatic disease; gout

Black Box Warning: Bone marrow suppression, cardiac disease, extravasation, renal failure, hepatic disease; requires a specialized care setting and an experienced clinician

DOSAGE AND ROUTES

Use decreased dose for those >60 yr

DAUNOrubicin

- **Adult: IV** 45-60 mg/m²/day × 3 days then 2 days of subsequent courses in combination, max 400-600 mg/m² total cumulative dose
- **Child: IV** 30-40 mg/m²/day depending on cycle (AML); ≤2 yr or <0.5 m²: 1 mg/kg on day 1 weekly in combination with vinCRIStine and predniSONE, base dose on body weight not surface area (ALL); >2 yr or 0.5 m²: 25 mg/m² day 1 weekly in combination with vinCRIStine and predniSONE (ALL)

DAUNOrubicin citrate liposomal

- **Adult: IV** 40 mg/m² q2wk (Kaposi's sarcoma); 100 mg/m² q3wk (multiple myeloma, unlabeled); **IV** 100-140 mg/m² q3wk (non-Hodgkin's lymphoma, unlabeled; metastatic breast cancer, unlabeled); IV escalating doses of 75, 100, 125, 135, 150 mg/m²/day × 3 days (AML, unlabeled)

Renal dose

- **Adult: IV** serum CCr >3 mg/dl, reduce dose by 50%

Hepatic dose

- **Adult: IV** serum bilirubin 1.2-3 mg/dl, reduce dose by 50%; bilirubin >3 mg/dl, reduce dose by 75%; bilirubin >5 mg/dl, omit dose

Available forms: Inj 20 mg powder/vial, *liposomal:* solution for inj 2 mg/ml
Administer:

- Antiemetic 30-60 min before giving product and 6-10 hr after treatment to prevent vomiting

Black Box Warning: To be used in a care setting with emergency equipment available

Black Box Warning: To be used by a clinician knowledgeable in cytotoxic therapy

Black Box Warning: Do not give by IM/subcut injection

IV route (Cerubidine)
Do not confuse with liposome

- Use cytotoxic handling precautions
- After diluting 20 mg/4 ml sterile water for inj (5 mg/ml), rotate, further dilute in 10-15 ml 0.9% NaCl; give over 3-5 min by direct IV through Y-tube or 3-way stopcock of inf of D_5 or 0.9% NaCl; or dilute in 50 ml 0.9% NaCl and give over 10-15 min; or dilute in 100 ml and give over 30 min
- Hydrocortisone for extravasation; apply ice compress after stopping inf

Solution compatibilities: $D_{5\,3}$%/0.3% NaCl, D_5W, Normosol R, LR, 0.9% NaCl
Y-site compatibilities: Amifostine, anidulafungin, atenolol, bivalirudin, bleomycin, CARBOplatin, caspofungin, CISplatin, codeine, cyclophosphamide, cytarabine, DACTINomycin, DAPTOmycin, dexmedetomidine, etoposide, fenoldopam, filgrastim, gemcitabine, gemtuzumab, granisetron, melphalan, meperidine, methotrexate, nesiritide, octreotide, ondansetron, oxaliplatin, PACLitaxel,

palonosetron, quinupristin-dalfopristin, rituximab, sodium acetate/bicarbonate, teniposide, thiotepa, tigecycline, trastuzumab, vinCRIStine, vinorelbine, voriconazole, zoledronic acid

IV route (DaunoXome)

• Dilute with D_5W to (1 mg/ml), give over 1-2 hr, do not use in-line filter, reconstituted sol may be stored ≤6 hr refrigerated; do not admix

IV compatibilities: Anidulafungin, bivalirudin, meperidine, octreotide, sodium acetate, tirofiban, trastuzumab

SIDE EFFECTS

DAUNOrubicin

CNS: Fever, chills

CV: CHF, pericarditis, myocarditis, peripheral edema, fatal myocarditis, left ventricular failure, QT prolongation, ST-T wave changes, QRS voltage changes, tachycardia, SVT, PVCs

GI: *Nausea, vomiting, anorexia, mucositis,* hepatotoxicity

GU: Impotence, sterility, amenorrhea, gynecomastia

HEMA: Thrombocytopenia, leukopenia, anemia

INTEG: *Rash,* extravasation, dermatitis, reversible alopecia, cellulitis, thrombophlebitis at inj site

SYST: Anaphylaxis, tumor lysis syndrome

DAUNOrubicin citrate liposomal

CNS: *Fatigue, headache,* depression, insomnia, dizziness, *malaise, neuropathy*

CV: Chest pain, edema

GI: Abdominal pain, stomatitis, *nausea, vomiting, diarrhea,* constipation

INTEG: *Alopecia, pruritus,* sweating

MISC: *Allergic reactions, chest pain, fever,* edema, flulike symptoms

MS: *Rigors,* arthralgia, back pain

RESP: *Cough, dyspnea, rhinitis, sinusitis*

PHARMACOKINETICS

Half-life 18½ hr, liposome 55½ hr; metabolized by liver; crosses placenta; excreted in breast milk, urine, bile

INTERACTIONS

Increase: QT prolongation, torsades de pointes—arsenic trioxide, chloroquine, clarithromycin, class IA, class III antidysrhythmics, dasatinib, dolasetron, droperidol, erythromycin, flecainide, halofantrine, haloperidol, levomethadyl, methadone, ondansetron, palonosetron, pentamidine, some phenothiazines, propafenone, risperiDONE, sparfloxacin; tricyclic antidepressants (high doses); vorinostat, ziprasidone

Increase: bleeding risk—NSAIDs, salicylates, anticoagulants, platelet inhibitors, thrombolytics

Increase: toxicity—other antineoplastics, radiation, cyclophosphamide

Decrease: DAUNOrubicin effects—hematopoietic progenitor cells given within 24 hr

Decrease: antibody reaction—live virus vaccines

Drug/Lab Test

Increase: uric acid

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Bone marrow suppression: CBC, differential, platelet count weekly, leukocyte nadir within 2 wk after administration, recovery within 3 wk; do not administer if absolute granulocyte count is $<750/mm^3$ (liposome)

• **Acute renal failure, uric acid nephropathy:** renal studies: BUN, urine CCr, electrolytes, uric acid baseline before each dose; I&O ratio; report fall in urine output to <30 ml/hr; provide aggressive alkalinization of urine and use of allopurinol; can prevent urate nephropathy

• Monitor temp q4hr; fever may indicate beginning infection

• **Hepatotoxicity:** monitor hepatic studies baseline before each dose: bilirubin, AST, ALT, alk phos; check for jaundice of skin, sclera; dark urine, clay-colored stools; itchy skin, abdominal pain, fever; diarrhea

Black Box Warning: Cardiac toxicity: chest x-ray, echocardiography, radionuclide angiography, MUGA, ECG; watch for ST-T wave changes, low QRS and QT prolongation, possible dysrhythmias (sinus tachycardia, heart block, PVCs); watch for CHF (jugular vein distention, weight gain, edema, crackles), may occur after 2-6 mo of treatment, cumulative dose (400-550 mg/m^2), 450 mg/m^2 if used in combination with radiation, cyclophosphamide

- Bleeding: hematuria, guaiac stools, bruising, petechiae, mucosa or orifices q8hr
- Effects of alopecia on body image; discuss feelings about body changes
- Buccal cavity q8hr for dryness, sores, ulceration, white patches, oral pain, bleeding, dysphagia, rinse mouth tid-qid with water, club soda; brush teeth bid-qid with soft brush or cotton-tipped applicators for stomatitis; use unwaxed dental floss
- **Tumor lysis syndrome:** hyperkalemia, hyperphosphatemia, hyperuricemia, hypocalcemia

Black Box Warning: Extravasation: swelling, pain, decreased blood return; if extravasation occurs, stop infusion, remove tubing, attempt to aspirate the drug prior to removing the needle, elevate area, treat with ice pack

- GI symptoms: frequency of stools, cramping

Perform/provide:

- Increased fluid intake to 2-3 L/day to prevent urate and calculi formation

Evaluate:

- Therapeutic response: decreased tumor size, spread of malignancy

Teach patient/family:

- To report signs of infection, bleeding, bruising, SOB, swelling, change in heart rate
- That hair may be lost during treatment; that wig or hairpiece may make patient feel better; that new hair may be different in color, texture
- To avoid pregnancy (D) while taking product and for 4 mo thereafter; not to breastfeed
- To avoid foods with citric acid, hot or rough texture if stomatitis is present
- To report any bleeding, white spots, ulcerations in mouth; to examine mouth daily
- That urine and other body fluids may be red-orange for 48 hr
- To avoid vaccines, alcohol, aspirin, NSAIDs while taking this product
- To avoid crowds, those with known infections

RARELY USED

deferasirox (Rx)

(def-a′sir-ox)

Exjade

Func. class.: Heavy metal chelating agent

USES: Chronic iron overload, transfusion hemosiderosis

CONTRAINDICATIONS: Breastfeeding, children, hypersensitivity, severe renal/hepatic disease, GI hemorrhage

DOSAGE AND ROUTES

- **Adult and child >2 yr: PO** 20-30 mg/kg/day; oral dispersion tablet is dissolved in water <1 g in 3.5 oz; >1 g in 7 oz or more; give on empty stomach at least 30 min before meals

degarelix

(day-gah-rel′iks)

Firmagon

Func. class.: Antineoplastic

Chem. class.: GnRH-receptor antagonist

ACTION: Reduces gonadotropins release and testicular steroidogenesis by reversibly binding to GnRH receptors

USES: Advanced prostate cancer

CONTRAINDICATIONS: Hypersensitivity

Precautions: Hypersensitivity

DOSAGE AND ROUTES

• **Adult (male): SUBCUT** 240 mg given as two 120 mg injections; (40 mg/ml concentration) maintenance 80 mg (20 mg/ml concentration) every 28 days, starting 28 days after first dose

Available forms: Injection 80, 120 mg vial

Administer:

• Do not give IV, subcut only

General reconstitution information:

• Use gloves, aseptic technique during preparation and administration

• Keep vials vertical at all times; do *not* shake the vials; give reconstituted drug within 1 hr after addition of sterile water for injection

Reconstitution of 120-mg vial (240 mg dose *only*):

• To achieve a 240-mg dose, two 120-mg vials of degarelix must be used. Repeat for each 120 mg vial: draw up exactly 3 ml of sterile water for injection with a 2-inch, 21-G needle; do not use bacteriostatic water for injection; inject the sterile water slowly into vial containing 120 mg; to maintain sterility, do not remove the syringe or the needle from the vial; keep the vial in an upright position and swirl gently until clear; avoid shaking; reconstitution can take up to 15 min; tilt the vial slightly and withdraw 3 ml (40 mg/ml), avoid turning the vial upside down; repeat with a new vial, needle, and syringe for the second 120-mg dose (total dose = 240 mg)

Reconstitution of 80-mg vial:

• Draw up 4.2 ml of sterile water for injection with a 2-inch, 21-G needle; do not use bacteriostatic water for injection; inject the sterile water slowly into vial containing 80 mg; do not remove the syringe or the needle from the vial; keep the vial upright, swirl gently until clear; avoid shaking; reconstitution can take up to 15 min; tilt vial slightly and withdraw 4 ml (20 mg/ml); avoid turning upside down during withdrawal

Subcut injection:

• Exchange the reconstitution needle with a 1.25-inch, 27-G needle; remove air bubbles; give in the abdominal region; rotate injection site periodically; use area not exposed to pressure; grasp the skin of abdomen, elevate the subcutaneous tissue, and insert the needle deeply at an angle ≥45 degrees; aspirate before injection; inject the dose subcut; when giving the loading dose of two 120 mg doses, the second dose should be injected at a different site

SIDE EFFECTS

CNS: Chills, dizziness, fatigue, fever, headache, insomnia

CV: Increased QT prolongation, hypotension, hot flashes

GI: Diarrhea, constipation, nausea

GU: ED, UTI, gynecomastia

INTEG: Injection site reactions, pain at site, redness, swelling

MS: Back pain, decreased bone density

PHARMACOKINETICS

Peak 2 days, duration 50 days, half-life 53 days

INTERACTIONS

Increase: QT prolongation—Class IA/III antidysrhythmics

Drug/Lab Test

Increase: PSA, LFTs

Decrease: bone density test

NURSING CONSIDERATIONS

Assess:

QT prolongation: More common in those taking Class IA/III antidysrhythmics, heart failure, congenital long QT syndrome; monitor cardiac status at baseline and often thereafter

• Liver function studies, PSA, GGT that may be elevated; bone density that may be decreased; electrolytes

Evaluate:

• Decreasing spread, size of tumor

Teach patient/family:

• To notify all prescribers of cardiac disease or use of cardiac products

• Injection technique if patient/family will be giving product (provide patient information)

delavirdine (Rx)

(de-la-veer'deen)

Rescriptor

Func. class.: Antiretroviral

Chem. class.: Nonnucleoside reverse transcriptase inhibitor (NNRTI)

ACTION: Binds directly to reverse transcriptase; blocks RNA-, DNA-dependent polymerase activities, causing a disruption of the enzyme's site

USES: HIV-1 in combination with at least 2 other antiretrovirals

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (C), breastfeeding, children, hepatic disease, achlorhydria, antimicrobial resistance, exfoliative dermatitis, hepatitis, immune reconstitution syndrome

DOSAGE AND ROUTES

• **Adult and adolescent ≥16 yr: PO** 400 mg tid, max 1200 mg/day

Available forms: Tabs 100, 200 mg

Administer:

• 100-mg tab: dispersion by adding 4 tab/3-4 oz water, let stand, stir, swallow, rinse glass, swallow; use only 100-mg tabs for dispersion; 200-mg tab take as intact tab

• Do not give within 1 hr of antacids or didanosine

• Always use as combination therapy; this product is not recommended for initial treatment; due to inferior, virologic effect, it is no longer listed as part of any preferred regimens

SIDE EFFECTS

CNS: Headache, fatigue, anxiety, insomnia, fever

GI: Diarrhea, abdominal pain, nausea, anorexia, vomiting, dyspepsia, hepatotoxicity

GU: Nephrotoxicity

HEMA: Neutropenia, leukopenia, thrombocytopenia, anemia, granulocytopenia

INTEG: Rash, pruritus

MISC: Cough

MS: Pain, myalgia

SYST: Stevens-Johnson syndrome; immune reconstitution syndrome (combination therapy)

PHARMACOKINETICS

98% protein bound, half-life 5.8 hr, peak 1 hr, duration 8 hr, extensively metabolized by CYP3A4, excreted in urine, feces

INTERACTIONS

Do not coadminister with nevirapine, efavirenz, rilpivirine, combined use not beneficial

⚠ Serious life-threatening adverse reaction: amphetamines, ergots, benzodiazepines, calcium channel blockers, sedative/hypnotics, antidysrhythmics, sildenafil, pimozide, cisapride, ALPRAZolam, astemizole, midazolam, terfenadine, opiates, triazolam

Increase: levels of ALPRAZolam, clarithromycin, dapsone, ergots, felodipine, midazolam, NIFEdipine, indinavir, saquinavir, lovastatin, simvastatin, atorvastatin, other CYP3A4, 2D6 inhibitors

Increase: delavirdine levels—FLUoxetine, ketoconazole

Increase: levels of both products—quiNIDine, warfarin, clarithromycin

Decrease: delavirdine levels—antacids, anticonvulsants, rifamycins, protease inhibitors, didanosine

Decrease: action of oral contraceptives, didanosine

Drug/Herb

Decrease: delavirdine level—St. John's wort

NURSING CONSIDERATIONS

Assess:

• **HIV:** obtain hepatitis B virus (HBV) screening to ensure proper treatment, if coinfected, a fully suppressive antiretroviral regimen with products against both; CBC, blood chemistry, plasma HIV RNA,

absolute CD41/CD81/cell counts/%, serum β-2 microglobulin, serum ICD124 antigen levels

- **Immune reconstitution syndrome:** when treated with combination therapy; development of opportunistic infections (*Mycobacterium avium complex* [MAC], cytomegalovirus [CMV], *Pneumocystis carinii* pneumonia [PCP], TB)
- Signs of infection, anemia
- Hepatic studies: ALT, AST; renal studies
- Bowel pattern before, during treatment; if severe abdominal pain with bleeding occurs, product should be discontinued; monitor hydration
- Allergies before treatment, reaction to each medication; place allergies on chart
- Plasma delavirdine concentrations (trough 10 micromolar)
- **Toxicity:** severe nausea/vomiting, maculopapular rash
- **Serious skin reactions:** Stevens-Johnson syndrome; rash may occur within 1-3 wk of beginning treatment; if rash is not severe, manage with diphenhydrAMINE, hydrOXYzine, topical corticosteroids

Evaluate:

- Therapeutic response: increased CD4 cell count, decreased viral load, improvement in symptoms of HIV

Teach patient/family:

- To take as prescribed; if dose is missed, to take as soon as remembered up to 1 hr before next dose; not to double dose
- That tabs may be dissolved in ½ cup of water; to stir; when dissolved, drink right away; to rinse cup with water and drink to get all medication
- To make sure health care provider knows about all medications being taken
- That if severe rash, mouth sores, swelling, aching muscles/joints, or eye redness occur, to notify health care provider
- Not to breastfeed if taking this product
- That this product is not a cure, only controls symptoms

demecarium ophthalmic

See Appendix B

denosumab (Rx)

(den-oh'sue-mab)

Prolia, Xgeva

Func. class.: Bone resorption inhibitor

Chem. class.: Monoclonal antibody, bone resorption

D

ACTION: Neutralizes activity of receptor activator nuclear factor kappa-B ligand (RANKL) by binding to it and blocking its interaction with cell-surface receptors; use of a RANKL inhibitor may reduce bone turnover and decrease tumor burden

USES: Osteoporosis in postmenopausal women or men at high risk for fractures; increase bone mass in men who are receiving androgen deprivation therapy for prostate cancer and women receiving aromastase inhibitor therapy for breast cancer at high risk for fractures; prevention of skeletal-related events in bone metastases from solid tumors (Xgeva)

CONTRAINDICATIONS: Hypersensitivity, hypocalcemia

Precautions: Pregnancy (C), breastfeeding, child/infant/neonate, anemia, coagulopathy, diabetes mellitus, dialysis, eczema, hypoparathyroidism, immunosuppression, latex hypersensitivity, malabsorption syndrome, neoplastic disease, pancreatitis, parathyroid disease, dental/renal/thyroid disease, TB, vit D deficiency

DOSAGE AND ROUTES

Postmenopausal osteoporosis

- **Adult female: SUBCUT** 60 mg q6mo with 1000 mg calcium and 400 international units vitamin D, max 60 mg q6mo

Bone metastases from solid tumors (Xgeva)

- **Adult: SUBCUT** 120 mg q4wk, max 120 mg q4wk; administer with calcium and vitamin D as necessary to prevent hypocalcemia

Prevention of skeletal-related events with bone metastases from solid tumors

• **Adult: SUBCUT** (Xgeva): 120 mg q4wk

Available forms: Sol for inj 60 mg/ml (Prolia); 120 mg/1.7 ml (Xgeva)

Administer:

SUBCUT route

• Give acetaminophen before and for 72 hr after to decrease pain

• Do not use if particulate matter or discoloration is present; sol is clear and colorless to slightly yellow with small white/opalescent particles; remove from refrigerator and allow to warm to room temp (15-30 min)

• **Use of prefilled syringe with needle safety guard:** leave green guard in original position until after administration, remove and discard needle cap immediately before inj, give by subcut inj in upper arm/thigh or abdomen; after inj, point needle away from people and slide green guard over needle

• **Use of single-use vials:** use 27G needle, give in upper arm/thigh or abdomen, do not reinsert needle in vial, discard supplies as appropriate

• Store and use out of direct sunlight/heat; do not freeze, use within 14 days after removal from refrigerator, store unopened containers in refrigerator

SIDE EFFECTS

CNS: Chills, fever, flushing, headache, vertigo, neuropathic pain

CV: Angina, atrial fibrillation

GI: Abdominal pain, constipation, *diarrhea,* flatulence, GERD, *vomiting, nausea*

GU: Cystitis, lactation suppression

HEMA: Anemia, neutropenia

INTEG: Atopic dermatitis, pruritus

META: Hypercholesterolemia, hypocalcemia, hypophosphatemia

MS: Back, bone pain; MS pain, myalgia, osteonecrosis of the jaw, atypical low trauma femoral fractures

RESP: Cough, *dyspnea*

SYST: Infection, secondary malignancy

PHARMACOKINETICS

Terminal half-life 25.4 days, bioavailability 62%, max serum concentration 3-21 days, steady state 6 mo

INTERACTIONS

Increase: infection, possible—immunosupressives, corticosteroids

Increase: osteonecrosis of the jaw, possible—antineoplastics, corticosteroids

NURSING CONSIDERATIONS

Assess:

• **Acute acute-phase reaction:** fever, myalgia, headache, flulike symptoms for 72 hr after inj, usually resolves after 72 hr

• **Blood tests:** serum calcium, creatitine, BUN, magnesium, phosphate

• **Hypocalcemia:** paresthesia, twitching, laryngospasm, Chvostek's and Trousseau's signs; preexisting hypocalcemia should be corrected before treatment; patient with vit D deficiency may require higher doses of vit D

• **Hypercalcemia:** nausea, vomiting, anorexia, weakness, thirst, constipation, dysrhythmias

• **Dental status:** correct dental complications before product use; good oral hygiene should be maintained; if dental work is to be performed, antiinfectives should be given to prevent osteonecrosis of the jaw

• **Infection:** do not start treatment in patients with active infections; infections should be resolved first

Evaluate:

• Therapeutic response: increased/maintained bone density, decreased calcium levels

Teach patient/family:

• To report hypercalcemic relapse: nausea, vomiting, bone pain, thirst

• To continue with dietary recommendations, including additional calcium and vit D

• To avoid use during pregnancy and breastfeeding; to notify prescriber if pregnancy is planned, suspected

- To use acetaminophen before and for 72 hr after inj to lessen bone pain
- About the purpose of this product and its expected results
- To avoid OTC, Rx medications and herbs and supplements unless approved by prescriber
- To exercise regularly, stop smoking, and avoid alcohol to maintain bone health
- To inform all health care providers of product use; to avoid dental procedures/surgery if possible; to practice good oral hygiene
- That lab tests and follow-up exams will be required

desipramine (Rx)

(dess-ip'ra-meen)

Norpramin

Func. class.: Antidepressant, tricyclic

Chem. class.: Dibenzazepine, secondary amine

ACTION: Blocks reuptake of norepinephrine, serotonin into nerve endings, thereby increasing action of norepinephrine, serotonin in nerve cells

USES: Depression

Unlabeled uses: Chronic pain, postherpetic neuralgia, ADHD, bulimia, diabetic neuropathy, panic disorder, social phobia

CONTRAINDICATIONS: Hypersensitivity to tricyclics, closed-angle glaucoma, acute MI

Precautions: Pregnancy (C), breastfeeding, geriatric patients, severe depression, increased intraocular pressure, seizure disorder, CV disease, urinary retention, cardiac dysrhythmias, cardiac conduction disturbances, family history of sudden death, prostatic hypertrophy, thyroid disease

Black Box Warning: Children <18 yr, suicidal patients

DOSAGE AND ROUTES

Major depression

- **Adult: PO** 50-75 mg/day in 1-4 divided doses, titrate by 25-50 mg weekly up to 300 mg/day in single or divided doses
- **Geriatric: PO** 25 mg/day at bedtime, titrate weekly, may increase to 150 mg/day
- **Adolescent: PO** 25-50 mg/day in divided doses, max 150 mg/day
- **Child 6-12 yr: PO** 1-3 mg/kg/day in divided doses; give >3 mg/kg/day with close medical monitoring; max 5 mg/kg/day

Bulimia nervosa (unlabeled)

- **Adult: PO** 25 mg tid, may titrate to 200 mg/day by 25-50 mg/day at weekly intervals

ADHA (unlabeled)

- **Child ≥5 yr: PO** up to 3.5 mg/kg/day divided BID

Neuropathic pain/postherpetic neuralgia (unlabeled)

- **Adult: PO** 10-25 mg at bedtime, titrate to relief

Diabetic neuropathy (unlabeled)

- **Adult: PO** 75-150 mg

Available forms: Tabs 10, 25, 50, 75, 100, 150 mg

Administer:

- Increased fluids, bulk in diet for constipation, especially in geriatric patients; with food or milk for GI symptoms; crushed if patient is unable to swallow medication whole
- Dosage at bedtime if oversedation occurs during day; may take entire dose at bedtime; geriatric patients may not tolerate once-daily dosing

SIDE EFFECTS

CNS: *Dizziness, drowsiness,* confusion, headache, anxiety, tremors, stimulation, weakness, insomnia, nightmares, EPS (geriatric patients), increased psychiatric symptoms, paresthenia, **suicidal ideation**

CV: *Orthostatic hypotension, ECG changes, tachycardia, hypertension,* palpitations

EENT: *Blurred vision,* tinnitus, mydriasis, ophthalmoplegia

GI: *Diarrhea, dry mouth,* nausea, vomiting, paralytic ileus, increased appetite, cramps, epigastric distress, jaundice, hepatitis, stomatitis, constipation, weight gain
GU: *Retention,* acute renal failure
HEMA: Agranulocytosis, thrombocytopenia, eosinophilia, leukopenia
INTEG: Rash, urticaria, sweating, pruritus, photosensitivity

PHARMACOKINETICS

Well absorbed, widely distributed, protein binding 92%, extensively metabolized in the liver to active metabolite of imipramine, half-life 7-60 hr

INTERACTIONS

Increase: serotonin syndrome, neuroleptic malignant syndrome—SSRIs, SNRIs, serotonin-receptor agonists, other tricyclic antidepressants
Increase: CNS depression—alcohol, barbiturates, opioids, CNS depressants
Increase: desipramine level—cimetidine, diltiazem, fluvoxaMINE, FLUoxetine, PARoxetine, sertraline, verapamil
Increase: life-threatening B/P elevations, do not use concurrently—cloNIDine
Increase: hypertension—EPINEPHrine, norepinephrine
Increase: hyperpyrexia, seizures, excitation; do not use within 14 days of MAOIs
Increase: QT interval—tricyclics, SUNItinib, vorinostat, ziprasidone, gatifloxacin, levofloxacin, moxifloxacin, sparfloxacin, class IA/III antidysrhythmics

Drug/Herb

Increase: serotonin syndrome, avoid concurrent use—St. John's wort
Increase: CNS depression—kava, valerian

Drug/Lab Test

Increase: serum bilirubin, blood glucose, alk phos

NURSING CONSIDERATIONS

Assess:

• B/P (lying, standing), pulse q4hr; if systolic B/P drops 20 mm Hg, hold product, notify prescriber; take VS q4hr in patients with cardiovascular disease
• Hepatic studies: AST, ALT, bilirubin; thyroid function studies
• Weight weekly; appetite may increase with product
• **ECG** for flattening T wave, bundle branch block, AV block, dysrhythmias in cardiac patients
• **EPS** primarily in geriatric patients: rigidity, dystonia, akathisia
• **Seizure activity** in those with a history of seizures

Black Box Warning: Mental status: mood, sensorium, affect, **suicidal tendencies,** increase in psychiatric symptoms (depression, panic); this product is not indicated for children

• Urinary retention, constipation; constipation most likely in children
• **Withdrawal symptoms:** headache, nausea, vomiting, muscle pain, weakness; not usual unless product discontinued abruptly
• Alcohol consumption; if consumed, hold dose until morning
• Check to confirm that PO medication is swallowed

Evaluate:

• Therapeutic response: decreased depression

Teach patient/family:

• That therapeutic effects may take 2-3 wk

Black Box Warning: That suicidal thoughts/behaviors may occur; to notify prescriber immediately

• To use caution when driving, performing other activities requiring alertness because of drowsiness, dizziness, blurred vision
• To avoid alcohol, other CNS depressants
• Not to discontinue medication abruptly after long-term use because this may cause nausea, headache, malaise
• To wear sunscreen or large hat because photosensitivity occurs

TREATMENT OF OVERDOSE:

ECG monitoring; lavage, activated charcoal; administer anticonvulsant

desirudin

(deh-sihr'uh-din)

Iprivask

Func. class.: Anticoagulant

Chem. class.: Thrombin inhibitor

ACTION: Selectively inhibits free and clot-bound thrombin, prevents activation of clotting factors

USES: Prevents DVT in hip-replacement surgery

CONTRAINDICATIONS: Hypersensitivity to this product, mannitol (diluent), hirudin, active bleeding, coagulation disorders

Precautions: Renal disease (CCr <60 ml/min), hepatic disease, GI/respiratory bleeding ≤3 mo, severe uncontrolled hypertension, spinal/epidural anesthesia, bacterial endocarditis children

Black Box Warning: Epidural anesthesia

DOSAGE AND ROUTES

• **Adult: SUBCUT** 15 mg every 12 hr × 9-12 days; give first dose 5-15 min before surgery and after induction if a regional block is used

Renal dose

• **Adult: SUBCUT** CCr 31-60 ml/min 5 mg q12hr; CCr < 31 ml/min 1.7 mg q12hr

Available forms: INJ 15 mg and mannitol 3% in water

Administer:

• Visually inspect particulate matter and discoloration prior to use, do not use sols that are cloudy or contain particles

• Do not use IM

Subcut route

• Do not mix with other injections, solvents, or parenteral fluids

• **Reconstitute** each vial with 0.5 ml of provided diluent, shake gently until the drug is fully reconstituted; the injection should be clear, colorless; once reconstituted, each 0.5 ml contains 15.75 mg desirudin; use immediately; however, it remains stable ≤24 hr at room temperature and protected from light. Discard any unused solution

• **Subcut injection:** Have patient sit or lie down; using a syringe with a 26- or 27-G needle, which is approximately 0.5-inch long, withdraw the entire reconstituted sol into the syringe; inject total volume subcut; alternate between the left and right anterolateral and left and right posterolateral thigh or abdominal wall; insert whole length of the needle in a skin fold held between the thumb and forefinger; the skin fold should be held throughout the injection; to minimize bruising, do not rub the site

SIDE EFFECTS

CNS: Dizziness, fever

CV: Thrombosis, thrombophlebitis, hypotension

EENT: Nosebleeds

GI: Hematemesis, nausea, vomiting

GU: Hematuria

HEMA: Hemorrhage, anemia

MISC: Anaphylaxis, impaired healing, edema

PHARMACOKINETICS

Onset ½ hr, 1-1½ hr, half-life 2 hr (12 hr in severe renal disease)

INTERACTIONS

Increase: bleeding risk—other anticoagulants, salicylates, NSAIDs, thrombolytics, glycoprotein IIb/IIIa antagonists, corticosteroids, dextran 40

Drug/Lab Test

Decrease: Hct/Hgb

NURSING CONSIDERATIONS

Assess:

Bleeding:

• Gums, black tarry stools, hematuria, epistaxis, decreased Hct/Hgb, guiac-positive stools, bleeding from hip-replacement site, notify prescriber if these occur; observe for thrombosis, ecchymosis

• Monitor aPTT daily in those with bleeding risk, CCr <60 ml/min, aPTT should not be >2× control

Black Box Warning: Epidural/spinal anesthesia sites for hematomas; can result in irreversible paralysis

- CCr baseline and qd if CCr >60 ml/min

Evaluate:

- Decreased occurrence of DVT in hip-replacement surgery

Teach patient/family:

- To report any signs of bleeding
- To use a soft-bristle toothbrush to avoid bleeding gums, to use an electric razor

desloratadine (Rx)

(des'lor-at'ah-deen)

Clarinex, Clarinex RediTabs

Func. class.: Antihistamine, 2nd generation

Chem. class.: Selective histamine (H_1)-receptor antagonist

ACTION: Binds to peripheral histamine receptors, thus providing antihistamine action without sedation

USES: Seasonal/perennial allergic rhinitis, chronic idiopathic urticaria, pruritus

CONTRAINDICATIONS: Hypersensitivity, infants/neonates

Precautions: Pregnancy (C), breastfeeding, child, asthma, renal/hepatic impairment

DOSAGE AND ROUTES

- **Adult and child ≥12 yr: PO** 5 mg/day
- **Child 6-11 yr: PO** 2.5 mg/day
- **Child 2-5 yr: PO** 1.25 mg/day
- **Child 6-11 mo: PO** 1 mg/day (urticaria, only)

Hepatic/renal dose

- **Adult: PO** 5 mg every other day

Available form: Tabs 5 mg; orally disintegrating tabs 2.5, 5 mg (Reditabs); syr 0.5 mg/ml

Administer:

- Without regard to meals
- Do not remove RediTabs from blister until ready to use
- RediTabs directly on tongue; may take with or without water

SIDE EFFECTS

CNS: Sedation (more common with increased doses), headache, psychomotor hyperactivity, seizures, fatigue

GI: Hepatitis, nausea, dry mouth

MISC: Flulike symptoms

PHARMACOKINETICS

Onset antihistamine effect 1 hr, relief as early as 1 day, duration up to 24 hr, peak 1½ hr, elimination half-life 8½-28 hr, metabolized in liver to active metabolites, excreted in urine

INTERACTIONS

Increase: CNS depression (rare)—alcohol, opiates, sedative/hypnotics, H_1 blockers, antipsychotics, tricyclic antidepressants, anxiolytics

Increase: desloratadine—nilotinib, etravirine

NURSING CONSIDERATIONS

Assess:

- **Allergy:** hives, rash, rhinitis; monitor respiratory status; stop product 4 days before antigen skin test

Evaluate:

- Therapeutic response: absence of running or congested nose, other allergy symptoms

Teach patient/family:

- To avoid driving, other hazardous activities if drowsiness occurs; to use caution until product's effects are known
- That product may cause photosensitivity; to use sunscreen or stay out of the sun to prevent burns
- Not to exceed max dose

desmopressin (Rx)

(des-moe-press'in)

DDAVP, Minirin, Octostim ✱, Stimate

Func. class.: Pituitary hormone

Chem. class.: Synthetic antidiuretic hormone

D

ACTION: Promotes reabsorption of water by action on renal tubular epithelium; causes smooth muscle constriction, increase in plasma factor VIII levels, which increases platelet aggregation, thereby resulting in vasopressor effect; similar to vasopressin

USES: Hemophilia A, von Willebrand's disease type 1, nonnephrogenic diabetes insipidus, symptoms of polyuria/polydipsia caused by pituitary dysfunction, nocturnal enuresis

Unlabeled uses: Cardiopulmonary bypass, sickle cell disease, uremic bleeding

CONTRAINDICATIONS: Hypersensitivity, nephrogenic diabetes insipidus, severe renal disease

Precautions: Pregnancy (B), breastfeeding, coronary artery disease, hypertension, cystic fibrosis, thrombus

DOSAGE AND ROUTES

Primary nocturnal enuresis

- **Adult and child ≥6 yr: PO** 0.2 mg at bedtime, max 0.6 mg at bedtime; intranasal 0.2 ml at bedtime, half in each nostril

Diabetes insipidus

- **Adult: INTRANASAL** 0.1-0.4 ml/day in divided doses (1-4 sprays with pump); **IV/SUBCUT** 2-4 micromcg/day in 2 divided doses
- **Child 3 mo to 12 yr: INTRANASAL** 0.05-0.3 ml/day in divided doses

Hemophilia/von Willebrand's disease

- **Adult and child >3 mo: IV** 0.3 mcg/kg in 0.9% NaCl over 15-30 min; may repeat if needed

Antihemorrhagic

- **Adult and child >3 mo: IV** 0.3 mcg/kg
- **Adult and child <50 kg: INTRANASAL** 1 spray in 1 nostril
- **Adult and child >50 kg:** 1 spray in each nostril

Cardiopulmonary bypass (unlabeled)

- **Adult: IV** 0.3 mcg/kg with aminocaproic acid given as a single postop dose

Sickle cell disease (unlabeled)

- **Adult: SUBCUT/IV** 0.3 mcg/kg with a high fluid intake

Uremic bleeding (unlabeled)

- **Adult: SUBCUT/IV** 0.3-0.4 mg/kg as a single inj

Available forms: Inj 4, 15 mg/ml; Rhihal tube delivery 2.5 mg/vial (0.1 mg/ml); tabs 0.1, 0.2 mg; nasal spray pump 10 mcg/spray (0.1 mg/ml); nasal sol 1.5 mg/ml (150 mcg/dose)

Administer:

PO route

- Store at room temperature

Direct IV route

- Undiluted over 1 min for diabetes insipidus

Intermittent IV INF route

- Diluted single dose/50 ml of 0.9% NaCl (adult and child >10 kg), single dose/10 ml as IV inf over 15-30 min for von Willebrand's disease or hemophilia A
- Store in refrigerator

SIDE EFFECTS

CNS: Drowsiness, headache, lethargy, flushing, seizures

CV: Increased B/P, palpitations, tachycardia

EENT: Nasal irritation, congestion, rhinitis

GI: Nausea, heartburn, cramps

GU: Vulval pain

META: Hyponatremia, hyponatremia-induced seizures

SYST: Anaphylaxis (IV)

PHARMACOKINETICS

PO: Onset 1 hr, peak 4-7 hr

INTRANASAL: Onset 1 hr; peak 1-4 hr; duration 8-20 hr; half-life 8 min, 76 min (terminal)

IV: Onset 1 min, peak ½ hr, duration >3 hr

INTERACTIONS

Increase: antidiuretic action—carBAMazepine, chlorproPAMIDE, clofibrate
Increase: pressor effect—pressor products
Decrease: antidiuretic action—lithium, alcohol, demeclocycline, heparin, large doses of EPINEPHrine

NURSING CONSIDERATIONS

Assess:
- Pulse, B/P when giving IV or SUBCUT
- I&O ratio, weight daily; check for edema in extremities; if water retention severe, diuretic may be prescribed
- **Water intoxication:** lethargy, behavioral changes, disorientation, neuromuscular excitability
- Intranasal use: nausea, congestion, cramps, headache; usually decreased with decreased dose; for nasal mucosa changes: congestion, edema, discharge, scarring (nasal route)

⚠ For severe allergic reaction, including **anaphylaxis (IV route)**

- Urine volume/osmolality and plasma osmolality (diabetes insipidus)
- Factor VIII coagulant activity, bleeding time before using for hemostasis
- **Nocturnal enuresis:** frequency of enuresis before and during treatment

Evaluate:
- Therapeutic response: absence of severe thirst, decreased urine output, decreased osmolality

Teach patient/family:
- About the proper technique for nasal instillation: to insert tube into nostril to instill product
- To avoid OTC products (cough, hay fever) because these preparations may contain EPINEPHrine, decrease product response; not to use with alcohol because adverse reactions may occur
- To wear emergency ID specifying therapy
- That, if dose is missed, to take when remembered up to 1 hr before next dose; not to double dose; to avoid fluids from 1 hr to up to 8 hr after PO dose
- To report upper respiratory infection, nasal congestion to prescriber

desonide topical

See Appendix B

desoximetasone

(dess-ox'ee-met'ah-sone)

Topicort

Func. class.: Corticosteroid, topical

ACTION: Crosses cell membrane to attach to receptors to decrease inflammation, itching; inhibits multiple inflammatory cytokines

USES: Inflammation/itching of corticosteroid-responsive dermatoses on the skin

CONTRAINDICATIONS: Hypersensitivity, use of some preparations on face, axilla, groin, intertriginous areas; monotherapy in primary bacterial infection
Precautions: Pregnancy (C), breastfeeding, children, skin infections

DOSAGE AND ROUTES

Adult/child >10 yr:
- Apply to affected areas 2 times/day

Available forms: Cream 0.05%, 0.25%; ointment 0.05%, 0.25%; gel 0.05%
Administer:
Topical route
⚠ Do not use with occlusive dressings
- **Cream/ointment/lotion:** apply sparingly in a thin film and rub gently into the cleansed, affected area
- **Gel:** apply sparingly in a thin film and rub gently into the cleansed, affected area

SIDE EFFECTS

INTEG: Burning, folliculitis, pruritus, dermatitis, maceration

MISC: Hyperglycemia, glycosuria, systemic absorption, HPA axis suppression, Cushing syndrome

NURSING CONSIDERATIONS

Assess:
• Skin reactions: burning pruritus, folliculitis, dermatitis
Evaluate:
• Decreasing itching, inflammation on the skin
Teach patient/family:
Topical route
⚠ Not to use with occlusive dressings
• **Cream/ointment/lotion:** apply sparingly in a thin film and rub gently into the cleansed, affected area
• **Gel:** apply sparingly in a thin film and rub gently into the cleansed, affected area

desoxyephedrine nasal agent

See Appendix B

desvenlafaxine

Pristiq
Func. class.: Antidepressant, serotonin-receptor norepinephrine reuptake inhibitor (SNRI)

ACTION: May work by blocking the central presynaptic reuptake of 5-HT and NE, resulting in an increased sustained level of these neurotransmitters.

USES: Major depressive disorder
Unlabeled uses: Vasomotor symptoms (hot flashes) associated with menopause

CONTRAINDICATIONS: *Hypersensitivity* to this product or *venlafaxine, MAOI therapy*
Precautions: CNS depression, abrupt discontinuation, hypertension, hepatic/renal disease, hyponatremia, geriatric patients, pregnancy (C), labor and delivery, breastfeeding, angina, bleeding, cardiac dysrhythmias, MI, stroke, mania, hypovolemia, dehydration

Black Box Warning: Children, suicidal ideation

DOSAGE AND ROUTES

• **Adult: PO** Initially, 50 mg/day; max 400 mg/day with adjustments as needed
Renal dose
• **Adult: PO** CCr 30-50 ml/min 50 mg q day; CCr < 30 ml/min or end stage renal disease 50 mg q other day
Vasopastic effects of menopause (unlabeled)
• **Adult: PO** 100-150 mg/day
Available forms:
Extended release tabs 50, 100 mg
Administer:
• Without regard to food, food may minimize GI symptoms
• Extended release tab: do not crush, break, or chew
• Store at room temperature

SIDE EFFECTS

CNS: *Dizziness,* drowsiness, *headache,* tremor, paresthesias, asthenia, worsening of depression, suicidal thoughts/behaviors, seizures, fatigue, chills, yawning, hot flashes, flushing, *irritability, insomnia, anxiety, abnormal dreams, fatigue*
CV: Palpitations, sinus tachycardia, increased blood pressure, orthostatic hypotension
EENT: Blurred vision, mydriasis, tinnitus, bruxism
GI: *Nausea,* xerostomia, *diarrhea,* constipation, vomiting, anorexia, weight loss, dysgeusia, hypercholesterolemia, hypertriglyceridemia
GU: Urinary retention/hesitancy, orgasm dysfunction, decreased libido, impotence, proteinuria
HEMA: Impaired platelet aggregation
INTEG: Photosensitivity, hyperhidrosis, diaphoresis, rash
SYST: Serotonin syndrome, neuroleptic malignant syndrome–like symptoms, toxic epidermal necrolysis, Stevens-

Johnson syndrome, erythema multiforme, angioedema; neonatal abstinence syndrome (fetal exposure)

PHARMACOKINETICS

Protein binding 30%, elimination half-life 11 hrs; elimination half-life is increased (hepatic/renal disease)

INTERACTIONS

Increase: serotonin syndrome, neuroleptic malignant syndrome–like reactions—SSRIs, other SNRIs, serotonin receptor agonists (almotriptan, eletriptan, frovatriptan, naratriptan, rizatriptan, sumatriptan, zolmitriptan), TCAs, traZADone, sibutramine, SUMAtriptan, ergots, dexfenfluramine, fenfluramine, lithium, nefazodone, meperidine, phentermine, MAOIs, dextromethorphan, linezolid, promethazine, methylphenidate, dexmethylphenidate, mirtazapine, pentazocine, tryptophan; do not administer concurrently

Increase: bleeding risk—salicylates, thrombolytics, NSAIDs, platelet inhibitors, anticoagulants

Increase: CNS depression—alcohol, opioids, antihistamines, sedatives/hypnotics

Increase: hallucinations, delusions, disorientation—zolpidem

Drug/Herb

Increase: desvenlafaxine action—kava, valerian

Drug/Lab Test

Increase: sodium, cholesterol, triglycerides

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Suicidal thoughts/behaviors: mental status and mood, identify suicidal ideation

- **Serotonin syndrome, neuroleptic malignant syndrome–like symptoms:** assess for nausea/vomiting, sedation, dizziness, diaphoresis (sweating), facial flush, hallucinations, mental status changes, myoclonia, restlessness, shivering, elevated blood pressure, hyperthermia, muscle rigidity, autonomic instability, mental status changes; if serotonin syndrome occurs discontinue desvenlafaxine, and any other serotonergic agents
- Monitor B/P baseline and periodically during treatment
- Appetite and nutritional intake, weight loss is common, change diet as need to support weight

Evaluate:

- Decreased depression; increased sense of well-being, renewed interest in activities

Teach patient/family:

- To take as directed, not to double or skip doses; if a dose is missed, take as soon as remembered unless close to next dose; do not discontinue abruptly, decreased gradually

Black Box Warning: To report immediately suicidal thoughts/behaviors, have family members look for symptoms of suicidal ideation

- Not to operate machinery or engage in hazardous activities until reaction is known, may cause dizziness, drowsiness
- To avoid all other products unless approval by prescriber
- To report if pregnancy is planned or suspected (pregnancy category C) or if breastfeeding
- To report immediately allergic reactions, including rash, hives, difficulty breathing, or swelling of face, lips
- That continuing follow-up exams will be needed

dexamethasone (Rx)

(dex-ah-meth'a-sone)

Baycadron, Decadron, Dexasone ♣, DexPak, Maxidex ♣

dexamethasone sodium phosphate (Rx)

Func. class.: Corticosteroid, synthetic

Chem. class.: Glucocorticoid, long acting

Do not confuse:

Decadron/Percodan

ACTION: Decreases inflammation by suppression of migration of polymorphonuclear leukocytes, fibroblasts, reversal of increased capillary permeability and lysosomal stabilization, suppresses normal immune response, no mineralocorticoid effects

USES: Inflammation, allergies, neoplasms, cerebral edema, septic shock, collagen disorders, dexamethasone suppression test for Cushing Syndrome, adrenocortical insufficiency, TB, meningitis, acute exacerbations of MS

CONTRAINDICATIONS: Hypersensitivity to corticosteroids, sulfites or benzyl alcohol; fungal infections, abrupt discontinuation, coagulopathy, ulcerative colitis, seizure disorders

Precautions: Pregnancy (C), breastfeeding, diabetes mellitus, osteoporosis, seizure disorders, ulcerative colitis, CHF, myasthenia gravis, renal disease, peptic ulcer, esophagitis, recent MI, hypertension, TB, active hepatitis, psychosis, sulfite hypersensitivity, thromboembolic disorders

DOSAGE AND ROUTES

Inflammation

- **Adult: PO** 0.75-9 mg/day in divided doses q6-12hr or phosphate **IM** 0.5-9 mg/day divided q6-12hr
- **Child: PO** 0.024-0.34 mg/kg/day in divided doses q6-12hr

Anaphylactic shock

- **Adult: IV** (Phosphate) single dose 1-6 mg/kg or **IV** 40 mg q2-6hr as needed up to 72 hr

Cerebral edema

- **Adult: IV** (Phosphate) 10 mg, then 4-6 mg **IM** q6hr × 2-4 days, then taper over 1 wk
- **Child:** Loading dose 1-2 mg/kg **(PO/IM/IV)** then 1-1.5 mg/kg/day, max 16 mg/day divided q4-6hr for 2-4 days, then taper down weekly

Adrenocortical insufficiency

- **Adult: PO** 0.75-9 mg/day in divided doses
- **Child: PO** 0.03-0.3 mg/kg/day in 2-4 divided doses

Suppression test

- **Adult: PO** 1 mg at 11 PM or 0.5 mg q6hr × 48 hr

ARDS (unlabeled)

- **Adult: IM/IV** (phosphate) 0.5-9 mg/day in 2-4 divided doses
- **Child: IM/IV** 0.06-0.3 mg/kg/day or 1.2-10 mg/m^2 in divided doses q6-12hr

Bone pain (unlabeled)

- **Adult: PO/IV** 12-20 mg/day in divided doses

Pediatric bacterial meningitis (unlabeled)

- **Child and infant >2 mo: IV** 0.15 mg/kg qid × first 2 days of antibiotics

Available forms: Dexamethasone: tabs 0.5, 0.75, 1, 1.5, 2, 4, 6 mg; elix 0.5 mg/5 ml; oral sol 0.5 mg/5 ml, 1 mg/1 ml; **sodium phosphate:** 4, 10 mg/ml; ophth implant 0.7 mg; ophth susp drops/solution 0.1%

Administer:

PO route

- Titrated dose; use lowest effective dose
- With food or milk to decrease GI symptoms

IM route

- IM inj deeply in large muscle mass; rotate sites; avoid deltoid; use 21G needle
- In 1 dose in AM to prevent adrenal suppression; avoid SUBCUT administration, may damage tissue

Direct IV route (sodium phosphate)

- Undiluted direct over ≤1 min

Intermittent IV INF route

- Diluted with 0.9% NaCl or D_5W, give as IV inf at prescribed rate

Dexamethasone sodium phosphate

Syringe compatibilities: Acetaminophen, caffeine, dimenhydrAMINE, furosemide, granisetron, hyaluronidase, ketamine, metoclopramide, octreotide, oxyCODONE, palonosetron, ranitidine, salbutamol, SUFentanil, traMADol

Y-site compatibilities: Acetaminophen, acyclovir, alfentanil, allopurinol, amifostine, amikacin, aminocaproic acid, ami-

nophylline, amphotericin B cholesteryl, amphotericin B lipid complex, amphotericin B liposome, amsacrine, anidulafungin, argatroban, ascorbic acid injection, atenolol, atracurium, atropine, aztreonam, benztropine, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, caffeine, CARBOplatin, carmustine, cefamandole, ceFAZolin, cefepime, cefmetazole, cefonicid, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, cefpirome, ceftaroline, cefTAZidime, ceftizoxime, ceftobiprole, cefTRIAXone, chloramphenicol, cimetidine, cisatracurium, CISplatin, cladribine, clindamycin, codeine, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, DAUNOrubicin, dexmedetomidine, digoxin, diltiazem, DOCEtaxel, DOPamine, doripenem, doxacurium, DOXOrubicin, DOXOrubicin liposomal, enalaprilat, ePHEDrine, EPINEPHrine, epoetin alfa, eptifibatide, ertapenem, etoposide, etoposide phosphate, famotidine, fentaNYL, filgrastim, fluconazole, fludarabine, fluorouracil, folic acid, fosaprepitant, foscarnet, furosemide, ganciclovir, gatifloxacin, gemcitabine, glycopyrrolate, granisetron, heparin, hydrocortisone, HYDROmorphone, ifosfamide, imipenem-cilastatin, indomethacin, insulin (regular), irinotecan, isoproterenol, ketorolac, lansoprazole, leucovorin, levofloxacin, lidocaine, linezolid, liposome, LORazepam, LR, mannitol, mechlorethamine, melphalan, meropenem, metaraminol, methadone, methicillin, methoxamine, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, mezlocillin, miconazole, milrinone, morphine, moxalactam, multiple vitamins injection, nafcillin, nalbuphine, naloxone, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxacillin, oxaliplatin, oxyCODONE, oxytocin, PACLitaxel, palonosetron, pamidronate, pancuronium, PEMEtrexed, penicillin G potassium/sodium, PENTobarbital, PHENobarbital, phenylephrine, phytonadione, piperacillin, piperacillin-tazobactam, potassium chloride, procainamide, propofol, propranolol, pyridoxine, ranitidine, remifentanil, Ringer's, ritodrine, riTUXimab, sargramostim, sodium acetate/bicarbonate, succinylcholine, SUFentanil, tacrolimus, telavancin, teniposide, theophylline, thiamine, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, TNA, tolazoline, topotecan, trastuzumab, trimetaphan, urokinase, vancomycin, vasopressin, vecuronium, verapamil, vinCRIStine, vinorelbine, vitamin B complex/C, voriconazole, zidovudine, zoledronic acid

SIDE EFFECTS

CNS: *Depression, flushing, sweating,* headache, mood changes, euphoria, psychosis, seizures, insomnia, pseudotumor cerebri

CV: *Hypertension,* circulatory collapse, tachycardia, edema, cardiomyopathy, thromboembolism, heart failure, dysrhythmias

EENT: Fungal infections, increased intraocular pressure, blurred vision, cataracts, glaucoma

ENDO: HPA suppression, hyperglycemia, sodium, fluid retention

GI: *Diarrhea, nausea, abdominal distention,* GI hemorrhage, *increased appetite,* pancreatitis

HEMA: Thrombocytopenia, transient leukocytosis, thromboembolism

INTEG: Acne, poor wound healing, ecchymosis, petechiae, hirsutism, angioedema

META: Hypokalemia

MS: Fractures, osteoporosis, weakness, arthralgia, myopathy

PHARMACOKINETICS

Half-life 1-2 days

PO: Onset 1 hr, peak 1-2 hr, duration $2^1/_2$ days

IM: Duration 2 days-3 wk

INTERACTIONS

Increase: toxicity—cycloSPORINE
Increase: side effects—alcohol, salicylates, amphotericin B, digoxin, cycloSPORINE, diuretics, NSAIDs
Increase: dexamethasone action—salicylates, estrogens, indomethacin, hormonal contraceptives, ketoconazole, macrolide antiinfectives, NSAIDs
Increase: tendinitis tendon rupture risk—quinolones
Increase: effect of—antidiabetics
Decrease: dexamethasone action—cholestyramine, colestipol, barbiturates, rifampin, ePHEDrine, phenytoin, theophylline, antacids, bosentan, carBAMazepine, ethotoin
Decrease: anticoagulant effect—anticonvulsants, antidiabetics, ambenonium, neostigmine, isoniazid, toxoids, vaccines, anticholinesterases, salicylates, somatrem
Decrease: potassium levels—thiazide diuretics

Drug/Lab Test

Increase: cholesterol, sodium, blood glucose, uric acid, calcium
Decrease: calcium, potassium, T_4, T_3, thyroid ^{131}I uptake test, urine 17-OHCS, 17-KS, PBI
False negative: skin allergy tests

NURSING CONSIDERATIONS

Assess:

- Potassium, blood, urine glucose while receiving long-term therapy; hypo/hyperglycemia
- Weight daily; notify prescriber of weekly gain >5 lb
- B/P, pulse; notify prescriber of chest pain
- I&O ratio; be alert for decreasing urinary output, increasing edema
- **Cushingoid symptoms:** Assess for buffalo hump, moon face, increased B/P; monitor; plasma cortisol levels during long-term therapy (normal: 138-635 nmol/L SI units when drawn at 8 AM); prolonged use can cause cushingoid symptoms
- **Infection:** fever, WBC even after withdrawal of medication; product masks infection
- **Potassium depletion:** paresthesias, fatigue, nausea, vomiting, depression, polyuria, dysrhythmias, weakness
- Edema, hypertension, cardiac symptoms
- **Mental status:** affect, mood, behavioral changes, aggression
- **Abrupt withdrawal:** acute adrenal insufficiency and death may occur following abrupt discontinuation of systemic therapy; withdraw gradually

Evaluate:

- Therapeutic response: decreased inflammation

Teach patient/family:

- That ID as corticosteroid user should be carried
- To contact prescriber if surgery, trauma, stress occurs because dose may need to be adjusted
- To notify prescriber if therapeutic response decreases because dosage adjustment may be needed
- To take with food or milk
- That bruising may occur easily
- That if on long-term therapy a high protein diet may be needed

⚠ Not to discontinue abruptly because **adrenal crisis** can result

- About symptoms of adrenal insufficiency: nausea, anorexia, fatigue, dizziness, dyspnea, weakness, joint pain
- To avoid OTC products: salicylates, alcohol in cough products, cold preparations unless directed by prescriber
- About all aspects of product usage, including cushingoid symptoms; to notify health care provider of infection
- To avoid exposure to chickenpox or measles, persons with infection

dexamethasone (ophthalmic)

(dex-a-meth'a-sone)

Maxidex

Func. class.: Ophthalmic antiinflammatory

Chem. class.: Corticosteroid

Do not confuse:
dexamethasone/desoximetasone

ACTION: Exact mechanism of antiinflammatory action unknown; inhibits multiple inflammatory cytokines; decreases inflammation, collagen deposits, capillary dilation, edema

USES: Treatment of corticosteroid-responsive ophthalmic disorders

CONTRAINDICATIONS: Hypersensitivity to this product or sulfites, ocular TB, acute herpes simplex (superficial), fungal/viral infections of the eye, posterior lens capsule rupture

Precautions: Corneal infected abrasions, glaucoma, pregnancy (C), breastfeeding, migration of intravitreal implant risk, children

DOSAGE AND ROUTES

Treatment of corticosteroid-responsive ophthalmic disorders including allergic conjunctivitis (not controlled topically), allergic marginal corneal ulcer, anterior segment inflammation, chorioretinitis, cyclitis, Graves' ophthalmopathy, giant papillary conjunctivitis (GPC), ophthalmic herpes zoster (herpes zoster ophthalmicus, herpes zoster keratitis), iritis, keratitis, superficial punctate keratitis, postoperative ocular inflammation, optic neuritis, diffuse choroiditis, sympathetic ophthalmia, vernal keratoconjunctivitis, corneal injury (corneal abrasion):

- **Adult:** Instill 1 or 2 drops of 0.1% ophthalmic sol or susp every hour during the day and every 2 hr at night; reduce application to every 4 hr after response occurs

Available forms: Ophthalmic solution, suspension 0.1%

Administer:

- For ophthalmic use only
- Instruct patient on proper instillation of eye ointment or solution. Do not touch the tip of the dropper to the eye, fingertips, or other surface, wait ≥15 min before inserting soft contact lens

SIDE EFFECTS

EENT: Burning, stinging, poor vision, corneal ulcerations, increased IOP, optic nerve damage

NURSING CONSIDERATIONS

Assess:

- **Corneal effects:** ulcerations, infections can worsen with this product

Evaluate:

- Decreased corneal inflammation

Teach patient/family:

- How to use products
- Not to share with others or use for other conditions
- To notify prescriber immediately if vision changes or if condition worsens
- To take as prescribed

dexamethasone topical

See Appendix B

dexlansoprazole (Rx)

(dex-lan-so-prey'zole)

Dexilant

Func. class.: Antiulcer, proton-pump inhibitor

Chem. class.: Benzimidazole

ACTION: Suppresses gastric secretion by inhibiting hydrogen/potassium ATPase enzyme system in gastric parietal cell; characterized as gastric acid pump in-

hibitor because it blocks final step of acid production

USES: Gastroesophageal reflux disease (GERD), severe erosive esophagitis, heartburn

CONTRAINDICATIONS:

Hypersensitivity

Precautions: Pregnancy (B), breastfeeding, children, proton-pump hypersensitivity, gastric cancer, hepatic disease, vit B_{12} deficiency

DOSAGE AND ROUTES

Erosive esophagitis

• **Adult: PO** 60 mg daily for up to 8 wk; maintenance: **PO** 30 mg daily for up to 6 mo

GERD

• **Adult: PO** 30 mg daily × 4 wk

Hepatic disease

• **Adult: PO** (Child-Pugh B): max 30 mg/day

Available forms: Del rel caps 30, 60 mg

Administer:

• Swallow caps whole; do not crush, chew caps; caps may be opened, contents sprinkled on food, use immediately; do not chew contents of capsule, give without regard to food

SIDE EFFECTS

CNS: Headache, dizziness, confusion, agitation, amnesia, depression, anxiety, seizures, insomnia, migraine

CV: Chest pain, angina, bradycardia, palpitations, CVA, hypertension, MI

EENT: Tinnitus

GI: Diarrhea, abdominal pain, vomiting, nausea, constipation, flatulence, colitis, dysgeusia

HEMA: Anemia, neutropenia, thrombocytopenia, pernicious anemia, thrombosis

INTEG: Rash, urticaria, pruritus

META: Gout

MS: Arthralgia, mylagia

RESP: Upper respiratory infections, cough, epistaxis, dyspnea, pneumonia

SYST: Anaphylaxis, Stevens-Johnson syndrome, toxic epidermal necrolysis, exfoliative dermatitis

PHARMACOKINETICS

Absorption 57%-64%; plasma half-life 1-2 hr; protein binding 96.1%-98.8%; extensively metabolized in liver; excreted in urine, feces; clearance decreased in geriatric patients, renal/hepatic impairment; peak dual 1-2 hr, 4-5 hr

INTERACTIONS

Increase: dexlansoprazole effect—CYP2C19, 3A4 inhibitors (fluvoxamine, voriconazole)

• Dexlansoprazole absorption: sucralfate

Decrease: absorption of ketoconazole, itraconazole, iron, delavirdine, ampicillin, calcium carbonate

Drug/Lab Test

Increase: LFTs, bilirubin, creatinine, glucose, lipids

Decrease: platelets, magnesium

NURSING CONSIDERATIONS

Assess:

• GI system: bowel sounds q8hr, abdomen for pain, swelling, anorexia, monitor serum magnesium

• **Hepatotoxicity (rare):** hepatitis, jaundice, monitor hepatic studies (AST, ALT, alk phos) if hepatic adverse reactions occur

• **Hypomagnesemia:** usually 3 mo to 1 yr after beginning therapy; monitor magnesium level, assess for irregular heart beats, muscle spasms; in children, fatigue, upset stomach, dizziness; magnesium supplement may be used

• **Anaphylaxis (rare), serious skin disorders:** require emergency intervention

Evaluate:

• Therapeutic response: absence of epigastric pain, swelling, fullness

Teach patient/family:

• To report severe diarrhea; product may have to be discontinued

- That diabetic patient should know that hypoglycemia may occur
- To avoid hazardous activities; dizziness may occur
- To avoid alcohol, salicylates, ibuprofen; may cause GI irritation
- To report allergic reactions, symptoms of low magnesium levels
- To notify prescriber if pregnancy is planned or suspected, not to breastfeed
- To swallow cap whole, not to chew, crush

dexmethylphenidate (Rx)

(dex'meth-ul-fen'ih-dayt)

Focalin, Focalin XR

Func. class.: Central nervous system (CNS) stimulant, psychostimulant

Controlled Substance Schedule II

Do not confuse:
dexmethylphenidate/methylphenidate

ACTION: Increases release of norepinephrine and dopamine into the extraneuronal space, also blocks the reuptake of norepinephrine and dopamine into the presynaptic neuron; mode of action for treating attention-deficit/hyperactivity disorder (ADHD) is unknown

USES: ADHD

CONTRAINDICATIONS: Breastfeeding, children <6 yr, hypersensitivity to methylphenidate, anxiety, history of Gilles de la Tourette's syndrome, tics, psychosis, glaucoma, concurrent treatment with MAOIs or within 14 days of discontinuing treatment with MAOIs

Precautions: Pregnancy (C), hypertension, depression, seizures, CV disorders, alcoholism

Black Box Warning: Substance abuse

DOSAGE AND ROUTES

- **Adult/adolescent/child >6 yr: PO** 2.5 mg bid with doses at least 4 hr apart, gradually increase to a maximum of 20 mg/day (10 mg bid); for those taking methylphenidate, use 1/2 of methylphenidate dose initially then increase as needed to a max of 20 mg/day
- **Adolescent and child ≥6 yr: EXT REL** 5 mg/day, may adjust to 20 mg/day in 5-mg increments, max 30 mg/day
- **Adult: PO EXT REL** 10 mg/day, may adjust to 20 mg/day in 10-mg increments, max 40 mg/day

Available forms: Tabs 2.5, 5, 10 mg; ext rel caps 5, 10, 15, 20, 25, 30, 35, 40 mg (Focalin XR)

Administer:

- Twice daily at least 4 hr apart; ext rel once a day; in the morning, ext rel cap may be opened and contents sprinkled onto applesauce and consumed without chewing
- Without regard to meals
- Do not break, crush, or chew ext rel product
- Med guide should be provided by dispenser

SIDE EFFECTS

CNS: Dizziness, headache, drowsiness, nervousness, insomnia, toxic psychosis, neuroleptic malignant syndrome (rare), Tourette's syndrome

CV: Palpitations, B/P changes, angina, dysrhythmias, tachycardia, MI, stroke

GI: *Nausea, anorexia*, abnormal hepatic function, hepatic coma, *abdominal pain*

HEMA: Leukopenia, anemia, thrombocytopenic purpura

INTEG: Exfoliative dermatitis, urticaria, rash, erythema multiforme

MISC: *Fever*, arthralgia, scalp hair loss

PHARMACOKINETICS

Readily absorbed, elimination half-life 2.2 hr, metabolized by liver, excreted by kidneys

PO: Peak 1 1/2 hr, onset 1/2-1 hr, duration 4 hr

PO-ER: Onset unknown, peak 4 hr, duration 8 hr

INTERACTIONS

Increase: hypertensive crisis—MAOIs or within 14 days of MAOIs, vasopressors
Increase: sympathomimetic effect—decongestants, vasoconstrictors
Increase: effects of anticonvulsants, tricyclics, SSRIs, coumarin
Decrease: effects of antihypertensives
Drug/Herb
• Synergistic effect: melatonin

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Substance abuse, past or current; psychotic episodes may occur, especially with parental abuse

• VS, B/P; may reverse antihypertensives; check patients with cardiac disease more often for increased B/P
• CBC, differential platelet counts during long-term therapy, urinalysis; with diabetes: blood glucose, urine glucose; insulin changes may have to be made because eating will decrease; platelets
• Height, growth rate q3mo in children; growth rate may be decreased
• Mental status: mood, sensorium, affect, stimulation, insomnia, aggressiveness, hostility
Withdrawal symptoms: headache, nausea, vomiting, muscle pain, weakness
• Appetite, sleep, speech patterns
• For attention span, decreased hyperactivity in persons with ADHD

Evaluate:
• Therapeutic response: decreased hyperactivity or ability to stay awake

Teach patient/family:
• To decrease caffeine consumption (coffee, tea, cola, chocolate); may increase irritability, stimulation
• To take early in day to prevent insomnia
• To avoid OTC preparations unless approved by prescriber; to avoid alcohol ingestion
• To taper off product over several wk to avoid depression, increased sleeping, lethargy
• To avoid hazardous activities until stabilized on medication
• To get needed rest; patients will feel more tired at end of day
• To notify all health care workers, including school nurse, of medication and schedule
• About information, instructions provided in patient information section
• To notify prescriber if pregnancy is planned or suspected, avoid breastfeeding

TREATMENT OF OVERDOSE:

Administer fluids; hemodialysis or peritoneal dialysis; antihypertensive for increased B/P; administer short-acting barbiturate before lavage

dextroamphetamine (Rx)

(dex-troe-am-fet'a-meen)

Dexedrine, ProCentra

Func. class.: Cerebral stimulant
Chem. class.: Amphetamine

Controlled Substance Schedule II

ACTION: Increases release of norepinephrine, dopamine in cerebral cortex to reticular activating system

USES: Narcolepsy, attention-deficit/hyperactivity disorder (ADHD)
Unlabeled uses: Obesity

CONTRAINDICATIONS: Hypersensitivity to sympathomimetic amines, hyperthyroidism, hypertension, glaucoma, severe arteriosclerosis, anxiety, anorexia nervosa, tartrazine dye hypersensitivity

Black Box Warning: Symptomatic CV disease, substance abuse

Precautions: Pregnancy (C), breastfeeding, children <3 yr, depression, Gilles de la Tourette's disorder, cardiomyopathy, bipolar disorder, abrupt discontinuation, acute MI; benzyl alcohol, salicylate hypersensitivity; hypercortisolism, obesity, psychosis, seizure disorder

DOSAGE AND ROUTES

Narcolepsy

- **Adult: PO** 5 mg bid, titrate daily dose by no more than 10 mg/wk, max 60 mg/day
- **Child 6-12 yr: PO** 5 mg/day, titrate daily dose by no more than 5 mg/day at weekly intervals

ADHD

- **Adult: PO** 5-60 mg/day in divided doses
- **Child 3-5 yr: PO** 2.5 mg/day increasing by 2.5 mg/day at weekly intervals, max 40 mg/day
- **Child >6-12 yr: PO** 5 mg daily-bid increasing by 5 mg/day at weekly intervals

Obesity, exogenous (unlabeled)

- **Adult and adolescent: PO** 5-30 mg/dose given 30-60 min before meals, use for 3-6 wk only

Available forms: Tabs 5, 10 mg; oral sol 5 mg/5 ml

Administer:

- At least 6 hr before bedtime to avoid sleeplessness
- Use calibrated measuring device for oral sol
- Store all forms at room temperature

SIDE EFFECTS

CNS: *Hyperactivity, insomnia, restlessness, talkativeness,* dizziness, headache, chills, stimulation, dysphoria, irritability, aggressiveness, tremor, dependence, addiction

CV: *Palpitations, tachycardia,* hypertension, decrease in heart rate, dysrhythmias

GI: *Anorexia,* dry mouth, diarrhea, constipation, weight loss, metallic taste

GU: Impotence, change in libido

INTEG: Urticaria

PHARMACOKINETICS

Onset 1 hr; peak 2 hr; duration 4-20 hr; ext rel onset 1 hr, peak 2 hr, duration 8 hr; metabolized by liver; urine excretion pH dependent; crosses placenta, breast milk; half-life 6-8 hr (child), 10-12 hr (adult)

INTERACTIONS

⚠ Hypertensive crisis: MAOIs or within 14 days of MAOIs

Increase: serotonin syndrome, neuroleptic malignant syndrome: SSRIs, SNRIs, serotonin-receptor agonists; do not use concurrently

Increase: dextroamphetamine effect—acetaZOLAMIDE, antacids, sodium bicarbonate

Increase: CNS effect—haloperidol, tricyclics, phenothiazines

Decrease: absorption of barbiturates, phenytoin

Decrease: dextroamphetamine effect—ascorbic acid, ammonium chloride, guanethidine

Decrease: effect of adrenergic blockers, antidiabetics, antihypertensives, antihistamines

Drug/Herb

- Serotonin syndrome: St. John's wort

Decrease: stimulant effect—eucalyptus

Drug/Food

Increase: amine effect—caffeine (cola, coffee, tea [green/black])

Drug/Lab Test

Increase: plasma corticosteroids, urinary steroids

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Cardiac disease: VS, B/P; product may reverse antihypertensives; check patients with cardiac disease often

Black Box Warning: Substance abuse: use for prolonged periods may lead to dependence; sudden death or serious CV events can occur from misuse; chronic intoxication (insomnia, irritability, personality changes)

- CBC, urinalysis; with diabetes: blood glucose, urine glucose; insulin changes may be required because eating will decrease
- Height, growth rate in children; growth rate may be decreased, weight
- Mental status: mood, sensorium, affect, stimulation, insomnia, irritability
- Tolerance or dependency: increased amount may be used to get same effect; will develop after long-term use
- **Overdose:** pain, fever, dehydration, insomnia, hyperactivity

Evaluate:

- Therapeutic response: increased CNS stimulation, decreased drowsiness

Teach patient/family:

- To take before meals (obesity)
- To decrease caffeine consumption (coffee, tea, cola, chocolate); may increase irritability, stimulation
- To avoid OTC preparations unless approved by prescriber
- To taper product over several wk; depression, increased sleeping, lethargy may occur
- To avoid alcohol ingestion
- To avoid hazardous activities until stabilized on medication
- To get needed rest; patient will feel more tired at end of day

TREATMENT OF OVERDOSE:

Administer fluids, hemodialysis, or peritoneal dialysis; antihypertensive for increased B/P, ammonium Cl for increased excretion

dextromethorphan (OTC)

(dex-troe-meth-or'fan)

Balminil ♣, Benylin ♣, Buckley's DM, Buckley's Mixture, Delsym 12-Hour, ElixSure Cough, Koffex ♣, Robitussin, Robitussin Cough with honey, Robitussin Long Acting Strength, Scot-Tussin Diabetes CF, Silphen-DM, Top Care Day Time Cough, Top Care Tussin Cough Suppressant Long-Acting, Triaminic Long Acting Cough, Tylenol Children's Simply Cough, Vicks DayQuil Cough, Vicks Formula 44, Wal-Tussin

Func. class.: Antitussive, nonopioid

Chem. class.: Levorphanol derivative

D

ACTION: Depresses cough center in medulla by direct effect

USES: Nonproductive cough caused by colds or inhaled irritants

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (C), fever, hepatic disease, asthma/emphysema, chronic cough

DOSAGE AND ROUTES

- **Adult and child ≥12 yr: PO** 10-20 mg q4hr or 30 mg q6-8hr, max 120 mg/day; **SUS-REL LIQ** 60 mg q12hr, max 120 mg/day
- **Child 6-12 yr: PO** 5-10 mg q4hr; **SUS REL LIQ** 30 mg bid, **LOZ** 5-10 mg q1-4hr; max 60 mg/day
- **Child 4-6 yr: PO** 2.5-7.5 mg q4-8hr, max 30 mg/day; **SUS REL LIQ** 15 mg bid
- **Child <2-5 yr:** 2.5-5 mg q4hr or 7.5 mg q6-8hr, max 30 mg/day; **EXT REL** not recommended

Available forms: Liq 7.5, 15 mg/5 ml; syr 10 mg/5 ml, 15 mg/5 ml, 30 mg/15

ml; gel caps 15 mg; caps 15 mg; ext rel susp: 30 mg/5 ml
Administer:
• **Chew tabs:** chew well; **syrup:** use calibrated measuring device; **ext rel susp:** shake well, use calibrated measuring device
• Decreased dose for geriatric patients; metabolism may be slowed

SIDE EFFECTS

CNS: *Dizziness,* sedation, confusion, ataxia, fatigue
GI: *Nausea*

PHARMACOKINETICS

PO: Onset 15-30 min, duration 3-6 hr
SUS: Duration 12 hr, terminal half-life 11 hr, metabolized by the liver, excreted via kidneys

INTERACTIONS

• Do not give with MAOIs or within 2 wk of MAOIs; avoid furazolidone, linezolid, procarbazine (MAOI activity)
Increase: CNS depression—alcohol, antidepressants, antihistamines, opioids, sedative/hypnotics
Increase: adverse reactions—amiodarone, quiNIDine, serotonin receptor agonist, sibutramine, SSRI

NURSING CONSIDERATIONS

Assess:
• **Cough:** type, frequency, character, including sputum
• Increase fluids to liquify secretions
Evaluate:
• Therapeutic response: absence of cough
Teach patient/family:
• To avoid driving, other hazardous activities until stabilized on medication
• To avoid smoking, smoke-filled rooms, perfumes, dust, environmental pollutants, cleaners that increase cough
• To avoid alcohol, CNS depressants
• To notify prescriber if cough persists over a few days

dextrose (D-glucose) (Rx)

Func. class.: Caloric, parenteral solution

ACTION: Needed for adequate utilization of amino acids; decreases protein, nitrogen loss; prevents ketosis

USES: Increases intake of calories; increases fluids in patients unable to take adequate fluids, calories orally; acute hypoglycemia

CONTRAINDICATIONS: Hyperglycemia, delirium tremens, hemorrhage (cranial/spinal), CHF, anuria, allergy to corn products (concentrated products)
Precautions: Cardiac/renal/hepatic disease, diabetes mellitus, carbohydrate intolerance

DOSAGE AND ROUTES

Hypoglycemia
• **Adult: PO/IV** 10-25 mg g/dose (20-50 ml of a 50% sol), may need subsequent continuous IV infusion of 10% dextrose
Acute symptomatic hypoglycemia (infants/neonates)
• **Neonate/infant: IV** 250-500 mg/kg/dose (25% sol)
Available forms: Inj 2.5%, 5%, 10%, 20%, 25%, 30%, 38.5%, 40%, 50%, 60%, 70%; oral gel 40%; chew tab 5 g
Administer:
• Do not use concentrated solutions IM/IV; 25%, 50% may be used IV
• Only (4%) protein and dextrose (up to 12.5%) via peripheral vein; stronger sol: central IV administration
• May be given undiluted via prepared sol; give 10% sol, 5 ml/15 sec; 10% sol, 1000 ml/3 hr or more; 20% sol, 500 ml/$\frac{1}{2}$-1 hr; 50% sol, 10 ml/min; control rate, rapid inf may cause fluid shifts, do not use same inf set as used for blood, never discontinue hypertonic products abruptly

• To reduce contamination, all IV sets should be replaced ≤24 hr
• Oral glucose preparations (gel, chew tabs) to be used in conscious patients only; check serum blood glucose 10 min after 1st dose

SIDE EFFECTS

CNS: Confusion, loss of consciousness, dizziness
CV: Hypertension, CHF, pulmonary edema, intracranial hemorrhage
ENDO: Hyperglycemia, rebound hypoglycemia, hyperosmolar syndrome, hyperglycemic nonketotic syndrome, aluminum toxicity, hypokalemia, hypomagnesium
GI: Nausea
GU: Glycosuria, osmotic diuresis
INTEG: Chills, flushing, warm feeling, rash, urticaria, extravasation necrosis
RESP: Pulmonary edema

INTERACTIONS

Increase: fluid retention/electrolyte excretion—corticosteroids
Drug/Lab Test
Increase: glucose

NURSING CONSIDERATIONS

Assess:
• Electrolytes (potassium, sodium, calcium, chlorine, magnesium), blood glucose, ammonia, phosphate
• Inj site for extravasation: redness along vein, edema at site, necrosis, pain; hard, tender area; site should be changed immediately
• Monitor temp for increased fever, indicating infection; if infection suspected, discontinue inf, culture tubing, bottle, catheter tip cultured
• Monitor glucose level, I&O, weight, fluid overload
• Nutritional status: calorie count by dietitian

Evaluate:
• Therapeutic response: increased weight

Teach patient/family:
• About the reason for dextrose inf
• To review hypoglycemia/hyperglycemia symptoms
• To review blood glucose monitoring procedures

D

diazepam (Rx)

(dye-az′-e-pam)

Diazemuls ✤, Diastat, Valium

Func. class.: Antianxiety, anticonvulsant, skeletal muscle relaxant, central acting

Chem. class.: Benzodiazepine, long-acting

Controlled Substance Schedule IV

Do not confuse:
diazepam/Ditropan/LORazepam

ACTION: Potentiates the actions of GABA, especially in the limbic system, reticular formation; enhances presympathetic inhibition, inhibits spinal polysynaptic afferent paths

USES: Anxiety, acute alcohol withdrawal, adjunct for seizure disorders; preoperatively as a relaxant for skeletal muscle relaxation; rectally for acute repetitive seizures
Unlabeled uses: Agitation, benzodiazepine withdrawal, chloroquine overdose, insomnia, seizure prophylaxis

CONTRAINDICATIONS: Pregnancy (D), hypersensitivity to benzodiazepines, closed-angle glaucoma, coma, myasthenia gravis, ethanol intoxication, hepatic disease, sleep apnea
Precautions: Breastfeeding, children <6 mo, geriatric patients, debilitation, renal disease, asthma, bipolar disorder, COPD, CNS depression, labor, Parkinson's disease, neutropenia, psychosis, seizures, substance abuse, smoking

DOSAGE AND ROUTES

Anxiety/seizure disorders

• **Adult: PO** 2-10 mg bid-qid; **IM/IV** 2-5 mg q3-4hr

• **Geriatric: PO** 1-2 mg daily-bid, increase slowly as needed

• **Child >6 mo: PO** 1-2.5 mg tid/qid; **IM/IV** 0.04-0.3 mg/kg/dose q2-4hr, max 0.6 mg/kg in an 8-hr period

Precardioversion

• **Adult: IV** 5-15 mg 5-10 min precardioversion

Preendoscopy

• **Adult: IV** 2.5-20 mg; **IM** 5-10 mg ½ hr preendoscopy

Muscle relaxation

• **Adult: PO** 2-10 mg tid-qid or **EXT REL** 15-30 mg/day; **IV/IM** 5-10 mg, repeat in 2-4 hr

• **Geriatric: PO** 2-5 mg bid-qid; **IV/IM** 2-5 mg, may repeat in 2-4 hr

Tetanic muscle spasms

• **Child >5 yr: IM/IV** 5-10 mg q3-4hr prn

• **Infant >30 days: IM/IV** 1-2 mg q3-4hr prn

Status epilepticus

• **Adult: IV/IM** 5-10 mg, 2 mg/min, may repeat q10-15min, max 30 mg; may repeat in 2-4 hr if seizures reappear

• **Child >5 yr: IM** 1 mg q2-5min; **IV** 1 mg slowly

• **Child 1 mo-5 yr: IV** 0.2-0.5 mg slowly; **IM** 0.2-0.5 mg slowly q2-5min up to 5 mg, may repeat in 2-4 hr prn

Seizures other than status epilepticus

• **Adult: RECT** 0.2 mg/kg, may repeat in 4-12 hr

• **Child 6-11 yr: RECT** 0.3 mg/kg, may repeat in 4-12 hr

• **Child 2-5 yr: RECT** 0.5 mg/kg, may repeat in 4-12 hr

Alcohol withdrawal

• **Adult: IV** 10 mg initially then 5-10 mg q3-4hr prn

Benzodiazepine withdrawal (unlabeled)

• **Adult: PO** Taper 0.5-2 mg over 4-16 wk

Febrile seizure prophylaxis (unlabeled)

• **Child 6 mo-5 yr: PO** 0.33 mg/kg q8hr until afebrile for ≥24 hr

Available forms: Tabs 2, 5, 10 mg; inj 5 mg/ml; oral sol 5 mg/5 ml, rectal 2.5 (pediatric), 10, 20 mg, twin packs; ext rel cap 15 mg

Administer:

• With food or milk for GI symptoms; crushed if patient is unable to swallow medication whole

• Reduced opioid dose by ⅓ if given concomitantly with diazepam

• **Concentrate:** use calibrated dropper only; mix with water, juice, pudding, applesauce; to be consumed immediately

Rectal route

• Do not use more than 5×/mo or for an episode q5days (Diastat)

Direct IV route

• Into large vein; give IV 5 mg or less/1 min or total dose over 3 min or more (children, infants); continuous inf is not recommended; inject as close to vein insertion as possible; do not dilute or mix with other products

SIDE EFFECTS

CNS: *Dizziness, drowsiness,* confusion, headache, anxiety, tremors, stimulation, fatigue, depression, insomnia, hallucinations, ataxia, fatigue

CV: *Orthostatic hypotension,* ECG changes, tachycardia, hypotension

EENT: *Blurred vision,* tinnitus, mydriasis, nystagmus

GI: Constipation, dry mouth, nausea, vomiting, anorexia, diarrhea

HEMA: Neutropenia

INTEG: Rash, dermatitis, itching

RESP: Respiratory depression

PHARMACOKINETICS

Metabolized by liver via CYP2C19, CYP3A4; excreted by kidneys; crosses placenta; excreted in breast milk; crosses the blood-brain barrier; half-life 20-50 hr; more reliable by mouth; 99% protein binding

PO: Rapidly absorbed, onset ½ hr, duration 2-3 hr
IM: Onset 15-30 min, duration 1-1½ hr, absorption slow and erratic
RECT: Peak 1.5 hr
IV: Onset immediate, duration 15 min-1 hr

INTERACTIONS

Increase: diazepam effect—amiodarone, protease inhibitors, diltiazem, cimetidine, clarithromycin, dalfopristin, quinupristin, delavirdine, disulfiram, efavirenz, erythromycin, fluconazole, fluvoxaMINE, imatinib, itraconazole, ketoconazole, IV miconazole, nefazodone, niCARdipine, ranolazine, troleandomycin, verapamil, voriconazole, zafirlukast, zileauton, valproic acid
Increase: toxicity—barbiturates, SSRIs, cimetidine, CNS depressants, valproic acid, CYP3A4 inhibitors
Increase: CNS depression—CNS depressants, alcohol
Decrease: diazepam metabolism—oral contraceptives, valproic acid, disulfiram, isoniazid, propranolol
Decrease: diazepam effect—CYP3A4 inducers (rifampin, barbiturates, carBAMazepine, ethotoin, phenytoin, fosphenytoin), smoking
Drug/Lab Test
Increase: AST/ALT, serum bilirubin

NURSING CONSIDERATIONS

Assess:
• B/P (lying, standing), pulse; respiratory rate; if systolic B/P drops 20 mm Hg, hold product, notify prescriber; respirations q5-15min if given IV
• Blood studies: CBC during long-term therapy; blood dyscrasias (rare); hepatic studies: AST, ALT, bilirubin, creatinine, LDH, alk phos
• **Degree of anxiety;** what precipitates anxiety and whether product controls symptoms
• **Alcohol withdrawal symptoms,** including hallucinations (visual, auditory), delirium, irritability, agitation, fine to coarse tremors
• Seizure control and type, duration, intensity of seizures
• For muscle spasms; pain relief
• IV site for thrombosis or phlebitis, which may occur rapidly
• Mental status: mood, sensorium, affect, sleeping pattern, drowsiness, dizziness, suicidal tendencies
• **Physical dependency, withdrawal symptoms:** headache, nausea, vomiting, muscle pain, weakness after long-term use

Evaluate:
• Therapeutic response: decreased anxiety, restlessness, insomnia

Teach patient/family:
• That product may be taken with food
• That product not to be used for everyday stress or for >4 mo unless directed by prescriber; to take no more than prescribed amount; that product may be habit forming
• To avoid OTC preparations unless approved by prescriber
• To avoid driving, activities that require alertness; drowsiness may occur
• To avoid alcohol, other psychotropic medications unless directed by prescriber; that smoking may decrease diazepam effect by increasing diazepam metabolism
• Not to discontinue medication abruptly after long-term use; to gradually taper
• To rise slowly or fainting may occur, especially in geriatric patients
• That drowsiness may worsen at beginning of treatment
• To notify prescriber if pregnancy is planned or suspected (D), avoid breastfeeding

TREATMENT OF OVERDOSE:

Lavage, VS, supportive care, flumazenil

dibucaine topical
See Appendix B

diclofenac epolamine (Rx)

(dye-kloe'fen-ak)

Flector

diclofenac potassium (Rx)

Cambia, Cataflam, Rapide ✤, Zipsor

diclofenac sodium (Rx)

Apo-Dilo ✤, Novo-Difenac ✤, Nu-Diclo ✤, PENNSAID, Sandoz Diclofenac ✤, Solaraze Topical Gel, Voltaren, Voltaren Topical Gel, Voltaren XR

Func. class.: Nonsteroidal antiinflammatory products (NSAIDs), nonopioid analgesic

Chem. class.: Phenylacetic acid

Do not confuse:
Cataflam/Catapres

ACTION: Inhibits COX-1, COX-2 by blocking arachidonate resulting in analgesic, antiinflammatory, antipyretic effects

USES: Acute, chronic RA; osteoarthritis; ankylosing spondylitis; analgesia; primary dysmenorrhea; patch: mild to moderate pain

Unlabeled uses: Arthralgia, headache, migraine, bone pain, myalgia

CONTRAINDICATIONS: Hypersensitivity to aspirin, iodides, other NSAIDs, bovine protein, asthma, serious CV disease; eczema, exfoliative dermatitis, skin abrasions (gel, patch)

Black Box Warning: Treatment of perioperative pain (CABG), surgery

Precautions: Pregnancy (C) (tabs, del rel tab, ext rel tab, top gel), (volteren, ophthalmic sol); pregnancy (B) (top gel)(solaraze); top patch, top sol, cap, powder for oral sol (C <30 wk, D >30 wk); breastfeeding, children, bleeding disorders, GI disorders, cardiac disorders, hypersensitivity to other antiinflammatory agents, CCr <30 ml/min, accidental exposure, acute bronchospasm, hypersensitivity to benzyl alcohol

Black Box Warning: GI bleeding, MI, stroke

DOSAGE AND ROUTES

Osteoarthritis

• **Adult: PO** (Cataflam) 50 mg bid-tid, max 150 mg/day; **DEL REL** (Voltaren) 50 mg bid-tid or 75 mg bid, max 150 mg/day; **EXT REL** (Voltaren-XR) 100 mg daily, max 150 mg/day; **TOP GEL** 1% (Voltaren gel) 4 g for each of lower extremities qid, max 16 g/day; 2 g for each of upper extremities qid, max 8 g/day; **TOP SOL** (Pennsaid) apply 40 drops to each affected knee qid; apply 10 drops at a time, spread over entire knee

Rheumatoid arthritis

• **Adult: PO** (Cataflam) 50 mg tid-qid, max 200 mg/day; **DEL REL** (Voltaren) 50 mg tid-qid or 75 mg bid, max 200 mg/day; **EXT REL** (Voltaren-XR) 100 mg daily, may increase to 200 mg/day, max 200 mg/day

Ankylosing spondylitis

• **Adult: PO DEL REL** (Voltaren) 25 mg qid and 25 mg at bedtime, max 125 mg/day

Acute migraine with/without aura

• **Adult: PO** (powder for oral sol) (Cambia) 50 mg as a single dose, mix contents of packet in 1-2 oz water

Mild to moderate pain

• **Adult: PO** (Zipsor) 25 mg qid

Dysmenorrhea or nonrheumatic inflammatory conditions

• **Adult: PO** (Cataflam) 50 mg tid or 100 mg initially then 50 mg tid, max 200 mg 1st day then 150 mg/day

Pain of strains/sprains

• **Adult: TOP PATCH** (Flector) apply patch to area bid

Actinic keratosis

• **Adult: TOP GEL** (Solaraze) apply to area bid

Prevention of heterotropic ossification (unlabeled)
• **Adult: PO** 50 mg tid × 3 wk
Renal dose
• **Avoid:** Use of topical gel, patch, sol, potassium oral tab for advanced renal disease
Available forms: Epolamine: topical patch 1.3%; **potassium:** tabs 50 mg; tabs liquid filled 25 mg; oral powder for sol 50 mg; **sodium:** delayed rel tabs (enteric-coated) 25, 50, 75, 100 mg; Pennsaid: top sol 1.5%, ext rel 100 mg; topical gel 1%, 3%
Administer:
PO route
• Do not break, crush, or chew enteric products
• Take with a full glass of water to enhance absorption, remain upright for ½ hr; if dose missed, take as soon as remembered within 2 hr if taking 1-2×/day; do not double doses
• Store at room temperature
Topical patch route (Flector)
• Wash hands before handling patch
• Remove and release liner before administration
• Use only on normal, intact skin
• Remove before bath, shower, swimming
• Discard removed patch in trash away from children, pets
• Store at room temperature
Topical gel route
• Apply to intact skin
• Use only for osteoarthritis, mild to moderate pain
• Store at room temperature, avoid heat, do not freeze
Topical solution route
• Apply to clean, dry skin
• Wait until dry before applying clothing, other creams/lotions
• Wait ≥30 min after use before bathing, swimming
• Store at room temperature

SIDE EFFECTS

CNS: *Dizziness, headache,* drowsiness, fatigue, tremors, confusion, insomnia, anxiety, depression, nervousness, paresthesia, muscle weakness
CV: CHF, tachycardia, peripheral edema, palpitations, dysrhythmias, hypo/hypertension, fluid retention, MI, stroke
EENT: Tinnitus, hearing loss, blurred vision, laryngeal edema
GI: Nausea, anorexia, vomiting, diarrhea, jaundice, cholestatic hepatitis, constipation, flatulence, cramps, dry mouth, peptic ulcer, GI bleeding, hepatotoxicity
GU: Nephrotoxicity: dysuria, hematuria, oliguria, azotemia, cystitis, UTI
HEMA: Blood dyscrasias, epistaxis, bruising
INTEG: Purpura, rash, pruritus, sweating, erythema, petechiae, photosensitivity, alopecia
META: Hyperglycemia, hypoglycemia
RESP: Dyspnea, hemoptysis, pharyngitis, bronchospasm, rhinitis, SOB
SYST: Anaphylaxis

PHARMACOKINETICS

PO: Peak 2-3 hr; **TOP Patch:** peak 12 hr; elimination half-life 2.5 hr, 99% bound to plasma proteins, metabolized in liver to metabolite, excreted in urine

INTERACTIONS

• Need for dosage adjustment: antidiabetics
Increase: hyperkalemia—potassium-sparing diuretics
Increase: anticoagulant effect—anticoagulants, NSAIDs, platelet inhibitors, salicylates, thrombolytics, SSRIs
Increase: toxicity—phenytoin, lithium, cycloSPORINE, methotrexate, digoxin, lithium
Increase: GI side effects—aspirin, other NSAIDs, bisphosphonates, corticosteroids
Decrease: antihypertensive effect—β-blockers, diuretics, ACE inhibitors
Decrease: effect of diuretics

Drug/Herb
Increase: bleeding risk—garlic, ginger, ginkgo; monitor for bleeding

NURSING CONSIDERATIONS

Assess:

Black Box Warning: CABG: do not use oral, top, gel, patch, in perioperative pain in coronary artery bypass graft surgery for 10-14 days

Black Box Warning: Stroke/MI: may increase CHF and hypertension, increased CV thrombotic events that may be fatal; those with CV disease may be at greater risk

- **Pain:** location, character, aggravating/alleviating factors, ROM before and 1 hr after dose
- Patients with asthma, aspirin hypersensitivity, nasal polyps; may develop hypersensitivity
- LFTs (may be elevated), uric acid (may be decreased—serum; increased—urine) periodically; also BUN, creatinine, electrolytes (may be elevated)
- **Blood dyscrasias (thrombocytopenia):** bruising, fatigue, bleeding, poor healing; blood counts during therapy; watch for decreasing platelets; if low, therapy may need to be discontinued, restarted after hematologic recovery; stool guaiac

Evaluate:

- Therapeutic response: decreased inflammation in joints, after cataract surgery

Teach patient/family:

- That product must be continued for prescribed time to be effective; to contact prescriber before surgery regarding when to discontinue this product
- To report bleeding, bruising, fatigue, malaise; **blood dyscrasias** do occur
- To avoid aspirin, alcoholic beverages, NSAIDs, or other OTC medications unless approved by prescriber
- To take with food, milk, or antacids to avoid GI upset; to swallow whole
- To use caution when driving; drowsiness, dizziness may occur
- To report **hepatotoxicity:** flulike symptoms, nausea, vomiting, jaundice, pruritus, lethargy
- To use sunscreen to prevent photosensitivity
- To notify all providers of product use
- To notify prescriber if pregnancy is planned or suspected (C, tabs) (C, <30 wk, D, >30 wk caps, topical patch/solution, powder for oral solution)

diclofenac ophthalmic

See Appendix B

RARELY USED

dicyclomine (Rx)

(dye-sye'kloe-meen)

Bentyl, Bentylol ♣, Formulex ♣, Lomine ♣

Func. class.: Gastrointestinal anticholinergic

USES: Treatment of peptic ulcer disease in combination with other products; infant colic, urinary incontinence, IBS

CONTRAINDICATIONS: Hypersensitivity to anticholinergics, closed-angle glaucoma, GI obstruction, myasthenia gravis, paralytic ileus, GI atony, toxic megacolon, dementia

DOSAGE AND ROUTES

- **Adult: PO** 10-20 mg tid-qid; **IM** 20 mg q4-6hr; max 160 mg/day
- **Child >2 yr: PO** 10 mg tid-qid
- **Child 6 mo-2 yr: PO** 5 mg tid-qid

didanosine (Rx)

(dye-dan'oh-seen)

ddI, Videx Pediatric Powder, Videx EC

Func. class.: Antiretroviral

Chem. class.: Nucleoside reverse transcriptase inhibitor (NRTI)

ACTION: Nucleoside analog incorporating into cellular DNA by viral reverse transcriptase, thereby terminating the cellular DNA chain

USES: HIV-1 infection in combination with at least 2 other antiretrovirals
Unlabeled uses: HIV prophylaxis

CONTRAINDICATIONS: Hypersensitivity, lactic acidosis, pancreatitis, phenylketonuria
Precautions: Pregnancy (B), breastfeeding, children, renal disease, sodium-restricted diets, elevated amylase, preexisting peripheral neuropathy, hyperuricemia, gout, CHF, noncirrhotic portal hypertension

Black Box Warning: Hepatic disease, lactic acidosis, pancreatitis

DOSAGE AND ROUTES

- **Adult/adolescent/child ≥6 yr and ≥60 kg: PO EXT REL CAP** 400 mg/day; if used with tenofovir, reduce to 250 mg/day
- **Adult/adolescent/child ≥6 yr and 25 kg to <60 kg: PO EXT REL CAP** 250 mg/day; if used with tenofovir, reduce to 200 mg/day
- **Adolescent 20 kg to <25 kg: PO EXT REL CAP** 200 mg/day
- **Adult ≥60 kg: PO ORAL SOL** 200 mg bid or 400 mg/day; if used with tenofovir, reduce to 250 mg/day
- **Adult <60 kg: PO ORAL SOL** 125 mg bid or 250 mg/day; if used with tenofovir, reduce to 200 mg/day
- **Adolescent/child/infant >8 mo: PO ORAL SOL** 120 mg/m² every 12 hr, max adult dosing
- **Infant <8 mo/neonate ≥2 wk: PO ORAL SOL** 100 mg/m² every 12 hr

Renal dose

- **Adult: PO** CrCl ≥60 ml/min: No change
- **Adult/adolescent ≥60 kg: PO** CCr 30–59 ml/min: reduce oral sol to 100 mg every 12 hr or 200 mg every 24 hr; reduce EXT-REL caps to 200 mg/day; CCr 10–29 ml/min: reduce oral sol to 150 mg every 24 hr; reduce EXT-REL caps to 125 mg/day; CCr <10 ml/min: reduce oral sol to 100 mg every 24 hr; reduce EXT-REL caps to 125 mg/day
- **Adult/adolescent <60 kg: PO** CCr 30–59 ml/min: reduce oral sol to 75 mg every 12 hr or to 150 mg every 24 hr; reduce EXT-REL caps to 125 mg/day; CCr 10–29 ml/min: reduce oral sol to 100 mg every 24 hr; reduce EXT-REL caps to 125 mg/day; CCr <10 ml/min: reduce oral sol to 75 mg every 24 hr; EXT-REL caps are not recommended

Intermittent hemodialysis/ continuous ambulatory peritoneal dialysis

- **Adult/adolescent >60 kg:** Give 100 mg oral sol or 125 mg EXT-REL CAPS every 24 hrs
- **Adult/adolescent <60 kg:** Give 75 mg oral sol every 24 hr, EXT-REL CAPS are not recommended

Available forms: Powder for oral sol 10 mg/ml; del rel caps 125, 200, 250, 400 mg

Administer:

- Pediatric powder for oral sol after preparation by pharmacist; dilution required using purified USP water then antacid (10 mg/ml), refrigerate, shake before use
- On an empty stomach ≥30 min before or 2 hr after meals
- Adjust dose with renal impairment

SIDE EFFECTS

CNS: Peripheral neuropathy, seizures, confusion, *anxiety,* hypertonia, abnormal thinking, asthenia, *insomnia,* CNS depression, pain, dizziness, chills, fever
CV: Hypertension, vasodilation, dysrhythmia, syncope, CHF, palpitation
EENT: Ear pain, otitis, photophobia, visual impairment, retinal depigmentation, optic neuritis
GI: Pancreatitis, *diarrhea, nausea,* vomiting, *abdominal pain,* constipation, stomatitis, dyspepsia, liver abnormalities, flatulence, taste perversion, dry mouth, oral thrush, melena, increased ALT/AST, alk phos, amylase, hepatic failure, noncirrhotic portal hypertension
GU: Increased bilirubin, uric acid
HEMA: Leukopenia, granulocytopenia, thrombocytopenia, anemia
INTEG: *Rash, pruritus,* alopecia, ecchymosis, hemorrhage, petechiae, sweating
MS: Myalgia, arthritis, myopathy, muscular atrophy
RESP: Cough, pneumonia, dyspnea, asthma, epistaxis, hypoventilation, sinusitis
SYST: Lactic acidosis, anaphylaxis

PHARMACOKINETICS

PO: Peak 0.67 hr, del rel 2 hr; elimination half-life 1.62 hr; extensive metabolism thought to occur; administration within 5 min of food will decrease absorption (50%); excreted urine, feces

INTERACTIONS

Increase: didanosine level—allopurinol, tenofovir
Increase: side effects from magnesium, aluminum antacids
Increase: pancreatitis risk—stavudine
Decrease: absorption—ketoconazole, dapsone
Decrease: concentrations of fluoroquinolones, other antiretrovirals, itraconazole, tetracyclines
Decrease: didanosine level—methadone
• Do not use with these products PO: gatifloxacin, gemifloxacin, grepafloxacin, levofloxacin, lomefloxacin, moxifloxacin, norfloxacin, sparfloxacin, trovafloxacin

Drug/Food
• Any food decreases rate of absorption 50%, do not use with food
• Do not use with acidic juices

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Pancreatitis: do not use in those with symptoms of pancreatitis; may be dose related in advanced HIV, alcoholism, history of pancreatitis

• **Peripheral neuropathy:** tingling or pain in hands and feet, distal numbness; onset usually occurs 2-6 mo after beginning treatment, may persist if product not discontinued

Black Box Warning: Lactic acidosis, severe hepatomegaly, pancreatitis: abdominal pain, nausea, vomiting, elevated hepatic enzymes; product should be discontinued because condition can be fatal

• Children by dilated retinal exam q6mo to rule out retinal depigmentation
• CBC, differential, platelet count monthly; notify prescriber of results; alk phos, monitor amylase; viral load, CD4 count
• Renal studies: BUN, serum uric acid, urine CCr before, during therapy
• Temp may indicate beginning infection
• Hepatic studies before, during therapy (bilirubin, AST, ALT) as needed, monthly

Perform/provide:
• Clean up of powdered products; use wet mop or damp sponge
• Storage of tabs, caps in tightly closed bottle at room temp; store oral sol after dissolving at room temp ≤4 hr

Evaluate:
• Therapeutic response: absence of infection; symptoms of HIV

Teach patient/family:
• To avoid use with alcohol, not to take with food
• To report numbness/tingling in extremities

- To take on an empty stomach; not to take dapsone at same time as ddI; not to mix powder with fruit juice; chew tab or crush and dissolve in water; to drink powder immediately after mixing
- To report signs of **infection:** increased temp, sore throat, flulike symptoms
- To report signs of **anemia:** fatigue, headache, faintness, SOB, irritability
- To report **bleeding;** to avoid use of razors, commercial mouthwash
- That hair may be lost during therapy (rare); that a wig or hairpiece may make patient feel better
- That product does not cure, only controls symptoms

RARELY USED

diflunisal

(dye-floo'ni-sal)

Dolobid

Func. class.: Nonsteroidal antiinflammatory drug

USES: Mild to moderate pain including osteoarthritis, rheumatoid arthritis

CONTRAINDICATIONS: Hypersensitivity to this product, NSAIDs, salicylates, severe renal disease

Black Box Warning: Perioperative pain after CABG

DOSAGE AND ROUTES

Osteoarthritis, rheumatoid arthritis

- **Adult: PO** 500-1500 mg/day in 2 divided doses every 12 hr
- **Child ≥12 yr: PO** 250-1000 mg/day in 2 divided doses every 12 hr, max 1500 mg

Pain

- **Adult/child ≥12 yr: PO** 1000 mg, then 500 mg every 8-12 hr; a lower dose may be used

Available forms: Tab 500 mg

difluprednate (ophthalmic)

(die-flu'pred-nate)

Durezol

Func. class.: Ophthalmic antiinflammatory

Chem. class.: Corticosteroid

D

ACTION: Exact mechanism of antiinflammatory action unknown; inhibits multiple inflammatory cytokines; decreases release of arachidonic acid, which increases in inflammation

USES: For the treatment of postoperative ocular pain and postoperative ocular inflammation; for the treatment of endogenous anterior uveitis

CONTRAINDICATIONS: Hypersensitivity to this product, glycerin, polysorbate, ocular TB, acute herpes simplex (superficial), fungal/viral infections of the eye

Precautions: Pregnancy (C), breastfeeding, children, corneal infected abrasions, glaucoma

DOSAGE AND ROUTES

Postoperative ocular pain and postoperative ocular inflammation

- **Adult/geriatric patients: OPHTH** Instill 1 drop into the conjunctival sac of the affected eye(s) qid beginning 24 hr after surgery; continue giving 4 ×/day for the first 2 wk of the postoperative period, then administer bid × 1 wk. At the end of the third week, taper dosage based on response

Endogenous anterior uveitis:

- **Adult: OPHTH** Instill 1 drop into the conjunctival sac of the affected eye(s) qid × 14 days, followed by tapering based on response

Available forms: Ophthalmic emulsion 0.05%

Administer:

- Apply topically to the eye, shake well before use

- Do not touch the tip of the dropper to the eye, fingertips, or other surface
- Instruct patient on proper instillation of eye sol
- When using this product, the patient should not wear contact lenses

SIDE EFFECTS

EENT: Burning, stinging, poor vision, corneal ulcerations, increased IOP, optic nerve damage

NURSING CONSIDERATIONS

Assess:

- **Corneal effects:** ulcerations, infections can worsen with this product, monitor IOP used IO over ten days

Evaluate:

- **Therapeutic response:** Decreased corneal inflammation

Teach patient/family:

- How to use product
- Not to share with others or use for other conditions
- To notify prescriber immediately if vision changes or if condition worsens
- To take as prescribed

⚠ HIGH ALERT

digoxin (Rx)

(di-jox'in)

APO-Digoxin ♣, Lanoxin

Func. class.: Cardiac glycoside, inotropic, antidysrhythmic

Chem. class.: Digoxin preparation

Do not confuse:

Lanoxin/Lasix/Lonox/Lomotil/Xanax/Levoxine

ACTION: Inhibits the sodium-potassium ATPase pump, which makes more calcium available for contractile proteins, thereby resulting in increased cardiac output (positive inotropic effect); increases force of contractions; decreases heart rate (negative chronotropic effect); decreases AV conduction speed

USES: Heart failure, atrial fibrillation, atrial flutter, atrial tachycardia, cardiogenic shock, paroxysmal atrial tachycardia, rapid digitalization in these disorders

Unlabeled uses: Atrial flutter, paroxysmal supraventricular tachycardia (PSVT) treatment/prophylaxis

CONTRAINDICATIONS: Hypersensitivity to digoxin, ventricular fibrillation, ventricular tachycardia, carotid sinus syndrome, 2nd- or 3rd-degree heart block

Precautions: Pregnancy (C), breastfeeding, geriatric patients, renal disease, acute MI, AV block, severe respiratory disease, hypothyroidism, sinus nodal disease, hypokalemia

DOSAGE AND ROUTES

Loading dose, IV route

- **Adult: IV** 400–600 mcg as a single dose, effect in 5–30 min, max effect 1–4 hr, give subsequent doses of 100–300 mcg every 6–8 hr
- **Adolescent/child >10 yr: IV** 8–12 mcg/kg , divided into ≥3 doses, with the first dose equaling approximately one-half the total, give subsequent doses every 4–8 hr
- **Child 5–10 yr: IV** 15–30 mcg/kg divided into ≥3 doses, with the first dose equaling approximately one-half the total, give subsequent doses every 4–8 hr
- **Child 2–4 yr: IV** 25–35 mcg/kg, divided into ≥3 doses, with the first dose equaling approximately one-half the total, give subsequent doses every 4–8 hr
- **Infant/child <2 yr: IV** 30–50 mcg/kg, divided into ≥3 doses, with the first dose equaling approximately one-half the total, give subsequent doses every 4–8 hr
- **Full-term neonate: IV** 20–30 mcg/kg, divided into ≥3 doses, with the first dose equaling approximately one-half the total, give subsequent doses every 4–8 hr
- **Premature neonate: IV** 15–25 mcg/

kg, divided into ≥3 doses, with the first dose equaling approximately one-half the total, give subsequent doses every 4–8 hr

Loading dose, PO (tablets):

Tablets are 60%–80% bioavailable; oral elixir should be used to obtain the appropriate dose in infants, young pediatric patients, or patients with very low body weight

- **Adult/adolescent/child >10 yr: PO** Total dosage of 10–15 mcg/kg in 3 divided doses, give one-half the total loading dose initially, then one-fourth the loading dose every 4–8 hr × 2 doses
- **Child 5–10 yr: PO** Total dosage of 20–45 mcg/kg in 3 divided doses, give one-half the total loading dose initially, then one-fourth the loading dose every 4–8 hr × 2 doses

Loading dose, PO (elixir): Elixir is approximately 70%–85% bioavailable

- **Adult/adolescent/child >10 yr: PO** Total dosage of 10–15 mcg/kg, give one-half the total loading dose initially, then additional fractions of the planned total dose at 4–8 hr
- **Child 5–10 yr: PO** Total dosage of 20–45 mcg/kg, give one-half the total loading dose initially, then additional fractions of the planned total dose at 4–8 hr
- **Child 2–4 yr: PO** Total dosage of 30–45 mcg/kg, give one-half the total loading dose initially, then additional fractions of the planned total dose at 4–8 hr
- **Infant/child <2 yr: PO** Total dosage of 35–60 mcg/kg, give one-half the total loading dose initially then additional fractions of the planned total dose at 4–8 hr
- **Full-term neonate: PO** Total dosage of 25–35 mcg/kg, give one-half the total loading dose initially, then additional fractions of the planned total dose at 4–8 hr
- **Premature neonate: PO** Total dosage of 20–30 mcg/kg, give one-half the total loading dose initially, then additional fractions of the planned total dose at 4–8 hr

Maintenance dose, IV

- **Adult: IV** 125–350 mcg/day, depending on CrCl, usual daily maintenance dosage for CHF based on corrected CrCl (ml/min/70 kg) and lean body weight (LBW) are listed below
- LBW 50–59 kg: CrCl ≥100 ml/min: 175 mcg//day; CrCl 70–99 ml/min: 150 mcg/day; CrCl 60–69 ml/min: 125 mcg/day
- LBW 60–69 kg: CrCl ≥90 ml/min: 200 mcg/day; CrCl 70–89 ml/min: 175 mcg/day; CrCl 60–69 ml/min: 150 mcg/day
- LBW 70–79 kg: CrCl ≥100 ml/min: 250 mcg/day; CrCl 90–99 ml/min: 225 mcg/day; CrCl 70–89 ml/min: 200 mcg/day; CrCl 60–69 ml/min: 175 mcg/day
- LBW 80–89 kg: CrCl ≥100 ml/min: 275 mcg/day; CrCl 80–99 ml/min: 250 mcg/day; CrCl 70–79 ml/min: 225 mcg/day; CrCl 60–69 ml/min: 200 mcg/day
- LBW 90–99 kg: CrCl ≥90 ml/min: 300 mcg/day; CrCl 80–89 ml/min: 275 mcg/day; CrCl 70–79 ml/min: 250 mcg/day; CrCl 60–69 ml/min: 225 mcg/day
- LBW ≥100 kg: CrCl ≥100 ml/min: 350 mcg/day; CrCl 90–99 ml/min: 325 mcg IV/day; CrCl 80–89 ml/min: 300 mcg/day; CrCl 70–79 ml/min: 275 mcg IV/day; CrCl 60–69 ml/min: 250 mcg/day
- **Child >10 yr:** 25%–35% of the IV digitalizing dose/day
- **Child 5–10 yr:** 25%–35% of the IV digitalizing dose bid
- **Children 2–4 yr:** 25%–35% of the IV digitalizing dose bid
- **Infant, child <2 yr:** 25%–35% of the IV digitalizing dose bid
- **Full term neonate:** 25%–35% of the IV digitalizing dose bid
- **Preterm neonate:** 20%–30% of the IV digitalizing dose bid

Maintenance dose, PO (tablets)

- **Adult/adolescent/child >10 yr: PO** 3.4–5.1 mcg/kg/day
- LBW 40–49 kg: CrCl ≥70 ml/min: 187.5 mcg/day; CrCl ≥60–69 ml/min: 125 mcg/day
- LBW 50–59 kg: CrCl ≥90 ml/min: 250 mcg/day; CrCl 60–89 ml/min: 187.5 mcg/day
- LBW 60–69 kg: CrCl ≥100 ml/min: 312.5 mcg/day; CrCl 60–99 ml/min: 250 mcg/day
- LBW 70–79 kg: CrCl ≥80 ml/min:

312.5 mcg/day; CrCl 60–79 ml/min: 250 mcg/day
• LBW 80–89 kg: CrCl ≥90 ml/min: 375 mcg/day; CrCl 60–89 ml/min: 312.5 mcg/day
• LBW 90–99 kg: CrCl ≥90 ml/min: 437.5 mcg/day; CrCl 70–89 ml/min: 375 mcg/day; CrCl 60–69 ml/min: 312.5 mcg/day
• LBW ≥100 kg: CrCl ≥100 ml/min: 500 mcg/day; CrCl 80–99 ml/min: 437.5 mcg/day; CrCl 60–79 ml/min: 375 mcg/day
• **Child 5–10 yr: PO** 6.4–12.9 mcg/kg/day in 2 divided doses is recommended starting maintenance dose

Maintenance dose, PO (elixir)

• **Adult/adolescent/child >10 yr: PO** 3–4.5 mcg/kg/day
• LBW 40–49 kg: CrCl ≥100 ml/min: 170 mcg/day; CrCl 90–99 ml/min: 160 mcg/day; CrCl 80–89 ml/min: 150 mcg/day; CrCl 70–79 ml/min: 140 mcg/day; CrCl 60–69 ml/min: 130 mcg/day
• LBW 50–59 kg: CrCl ≥100 ml/min: 213 mcg/day; CrCl 90–99 ml/min: 200 mcg/day; CrCl 80–89 ml/min: 188 mcg/day; CrCl 70–79 ml/min: 175 mcg/day; CrCl 60–69 ml/min: 163 mcg/day
• LBW 60–69 kg: CrCl ≥100 ml/min: 255 mcg/day; CrCl 90–99 ml/min: 240 mcg/day; CrCl 80–89 ml/min: 225 mcg/day; CrCl 70–79 ml/min: 210 mcg/day; CrCl 60–69 ml/min: 195 mcg/day
• LBW 70–79 kg: CrCl ≥100 ml/min: 298 mcg/day; CrCl 90–99 ml/min: 280 mcg/day; CrCl 80–89 ml/min: 263 mcg/day; CrCl 70–79 ml/min: 245 mcg/day; CrCl 60–69 ml/min: 228 mcg/day
• LBW 80–89 kg: CrCl ≥100 ml/min: 340 mcg/day; CrCl 90–99 ml/min: 320 mcg/day; CrCl 80–89 ml/min: 300 mcg/day; CrCl 70–79 ml/min: 280 mcg/day; CrCl 60–69 ml/min: 260 mcg/day
• LBW 90–99 kg: CrCl ≥100 ml/min: 383 mcg/day; CrCl 90–99 ml/min: 360 mcg/day; CrCl 80–89 ml/min: 338 mcg/day; CrCl 70–79 ml/min: 315 mcg/day; CrCl 60–69 ml/min: 293 mcg/day
• LBW ≥100 kg: CrCl ≥100 ml/min: 425 mcg/day; CrCl 90–99 ml/min: 400 mcg/day; CrCl 80–89 ml/min: 375 mcg/day; CrCl 70–79 ml/min: 350 mcg/day; CrCl 60–69 ml/min: 325 mcg/day
• **Child 5–10 yr: PO** 5.6–11.3 mcg/kg/day in 2 divided doses
• **Child 2–4 yr: PO** 9.4–13.1 mcg/kg/day in 2 divided doses
• **Infant/child <2 yr: PO** 11.3–18.8 mcg/kg/day in 2 divided doses
• **Full-term neonate: PO** 7.5–11.3 mcg/kg/day in 2 divided doses
• **Preterm neonate: PO** 4.7–7.8 mcg/kg/day in 2 divided doses

Renal dose, IV route

• **CrCl 50–59 ml/min:** LBW 50–59 kg: 125 mcg 1× daily; LBW 60–69 kg: 150 mcg 1× daily; LBW 70–79 kg: 175 mcg 1× daily; LBW 80–89 kg: 200 mcg 1× daily; LBW 90–99 kg: 225 mcg 1× daily; LBW ≥100 kg: 250 mcg 1× daily
• **CrCl 40–49 ml/min:** LBW 50–59 kg: 100 mcg 1× daily; LBW 60–69 kg: 125 mcg 1× daily; LBW 70–79 kg: 150 mcg 1× daily; LBW 80–89 kg: 175 mcg 1× daily; LBW 90–99 kg: 200 mcg 1× daily; LBW ≥100 kg: 225 mcg 1× daily
• **CrCl 30–39 ml/min:** LBW 50–59 kg: 100 mcg 1× daily; LBW 60–69 kg: 125 mcg 1× daily; LBW 70–89 kg: 150 mcg 1× daily; LBW 90–99 kg: 175 mcg 1× daily; LBW ≥100 kg: 200 mcg 1× daily
• **CrCl 20–29 ml/min:** LBW 50–69 kg: 100 mcg 1× daily; LBW 70–79 kg: 125 mcg 1× daily; LBW 80–99 kg: 150 mcg 1× daily; LBW ≥100 kg: 175 mcg 1× daily
• **CrCl 10–19 ml/min:** LBW 50–59 kg: 75 mcg 1× daily; LBW 60–79 kg: 100 mcg 1× daily; LBW 80–89 kg: 125 mcg 1× daily; LBW ≥90 kg: 150 mcg 1× daily
• **CrCl <10 ml/min** LBW 50–69 kg: 75 mcg 1× daily; LBW 70–89 kg: 100 mcg 1× daily; LBW 90–99 kg: 125 mcg 1× daily; LBW ≥100 kg: 150 mcg 1× daily

Renal dose, PO (tablets)

• **CrCl 40–59 ml/min:** LBW 50–69 kg: 187.5 mcg 1× daily
• **CrCl 50–59 ml/min:** LBW 70–89 kg: 250 mcg 1× daily; LBW ≥90 kg: 312.5 mcg 1× daily
• **CrCl 30–39 ml/min:** LBW 50–59 kg:

125 mcg 1× daily; LBW 60–79 kg: 187.5 mcg 1× daily; LBW 80–99 kg: 250 mcg 1× daily; LBW ≥100 kg: 312.5 mcg 1× daily

- **CrCl 20–29 ml/min:** LBW 50–69 kg: 125 mcg 1× daily; LBW 70–89 kg: 187.5 mcg 1× daily; LBW ≥90 kg: 250 mcg 1× daily
- **CrCl <20 ml/min:** LBW 50–69 kg: 125 mcg 1× daily; LBW 70–99 kg: 187.5 mcg 1× daily; LBW ≥100 kg: 250 mcg 1× daily

Renal dose, PO (elixir)

- **CrCl 50–59 ml/min:** LBW 50–59 kg: 150 mcg 1× daily; LBW 60–69 kg: 180 mcg 1× daily; LBW 70–79 kg: 210 mcg 1× daily; LBW 80–89 kg: 240 mcg 1× daily; LBW 90–99 kg: 270 mcg 1× daily; LBW ≥100 kg: 300 mcg 1× daily
- **CrCl 40–49 ml/min:** LBW 50–59 kg: 138 mcg 1× daily; LBW 60–69 kg: 165 mcg 1× daily; LBW 70–79 kg: 193 mcg 1× daily; LBW 80–89 kg: 220 mcg 1× daily; LBW 90–99 kg: 248 mcg 1× daily; LBW ≥100 kg: 275 mcg 1× daily
- **CrCl 30–39 ml/min:** LBW 50–59 kg: 125 mcg 1× daily; LBW 60–69 kg: 150 mcg 1× daily; LBW 70–79 kg: 175 mcg PO 1× daily; LBW 80–89 kg: 200 mcg PO 1× daily; LBW 90–99 kg: 225 mcg 1× daily; LBW ≥100 kg: 250 mcg PO 1× daily
- **CrCl 20–29 ml/min:** LBW 50–59 kg: 113 mcg 1× daily; LBW 60–69 kg: 135 mcg 1× daily; LBW 70–79 kg: 158 mcg 1× daily; LBW 80–89 kg: 180 mcg PO 1× daily; LBW 90–99 kg: 203 mcg 1× daily; LBW ≥100 kg: 225 mcg PO 1× daily
- **CrCl <20 ml/min:** LBW 50–59 kg: 100 mcg 1× daily; LBW 60–69 kg: 120 mcg 1× daily; LBW 70–79 kg: 140 mcg 1× daily; LBW 80–89 kg: 160 mcg 1× daily; LBW 90–99 kg: 180 mcg 1× daily; LBW ≥100 kg: 200 mcg 1× daily

The daily maintenance dose can also be estimated using patient CrCl and loading dose (LD) according to the method of Jelliffe and Brooker: Daily % loss = 14 + CrCl/5

Available forms: Caps 0.05, 0.1, 0.2 mg; elix 0.05 mg/ml; tabs 0.125, 0.25, 0.5 mg; inj 0.5 ♣, 0.25 mg/ml; pediatric inj 0.1 mg/ml

Administer:

PO route

⚠ Bioavailability varies among different oral dosage forms of digoxin and among different brands of the same dosage form. Changing from one preparation to another might require dosage adjustments.

- **All dosage forms:** May be administered without regard to meals
- **Tab:** May be crushed and administered with food or fluids
- **Pediatric elixir:** Administer using a calibrated measuring device

Injectable

- IV is preferred over IM because it is less painful
- PO should replace parenteral therapy as soon as possible
- Visually inspect parenteral products for particulate matter and discoloration before use

IM route

- Do not administer >2 ml at any one IM injection site.
- Inject deeply into gluteal muscle, then massage area

IV route

- May be given undiluted or each 1 ml may be diluted in 4 ml of sterile water for injection, NS, D_5W, or LR. Diluent volumes <4 ml will cause precipitation. Use diluted solutions immediately
- Inject over ≥5 min via Y-site or 3-way stopcock. In patients with pulmonary edema, administer over 10–15 min. To avoid inadvertent overdosage, do not flush the syringe following administration

Additive compatibilities: Cimetidine, floxacillin, furosemide, lidocaine, potassium chloride, ranitidine, verapamil

Syringe compatibilities: Heparin, milrinone

Y-site compatibilities: Acyclovir, alfentanil, amikacin, aminocaproic acid, aminophylline, amphotericin B lipid complex, anidulafungin, ascorbic acid

injection, atenolol, atracurium, atropine, aztreonam, benztropine, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, cefamandole, ceFAZolin, cefmetazole, cefonicid, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, cefTAZidime, ceftizoxime, ceftobiprole, cefTRIAXone, cefuroxime, cephalothin, cephapirin, chloramphenicol, chlorproMAZINE, cimetidine, ciprofloxacin, cisatracurium, CISplatin, clindamycin, codeine, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, dexmedetomidine, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, doripenem, doxacurium, doxycycline, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, epoetin alfa, eptifibatide, ertapenem, erythromycin, esmolol, etoposide, famotidine, fenoldopam, fentaNYL, fludarabine, fluorouracil, folic acid, furosemide, ganciclovir, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, heparin, hydrocortisone, HYDROmorphone, hydrOXYzine, ifosfamide, imipenem-cilastatin, indomethacin, irinotecan, isoproterenol, ketorolac, labetalol, levofloxacin, lidocaine, linezolid, LORazepam, LR, magnesium sulfate, mannitol, mechlorethamine, meperidine, meropenem, metaraminol, methicillin, methotrexate, methoxamine, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, mezlocillin, miconazole, midazolam, milrinone, morphine, moxalactam, multiple vitamins injection, mycophenolate mofetil, nafcillin, nalbuphine, naloxone, nesiritide, metilmicin, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxacillin, oxaliplatin, oxytocin, palonosetron, pamidronate, pancuronium, pantoprazole, papaverine, PEMEtrexed, penicillin G potassium/sodium, pentazocine, PENTobarbital, PHENobarbital, phenylephrine, phytonadione, piperacillin, piperacillin-tazobactam, polymyxin B, potassium chloride, procainamide, prochlorperazine, promethazine, propranolol, protamine, pyridoxine, quiNIDine, ranitidine, remifentanil, Ringer's, ritodrine, riTUXimab, rocuronium, sodium acetate/bicarbonate, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiamine, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, TNA, tobramycin, tolazoline, TPN, trastuzumab, trimetaphan, urokinase, vancomycin, vasopressin, vecuronium, verapamil, vinCRISTine, vinorelbine, vitamin B complex, voriconazole, zoledronic acid

SIDE EFFECTS

CNS: *Headache*, drowsiness, apathy, confusion, disorientation, fatigue, depression, hallucinations

CV: Dysrhythmias, *hypotension*, bradycardia, AV block

EENT: Blurred vision, yellow-green halos, photophobia, diplopia

GI: Nausea, vomiting, anorexia, abdominal pain, diarrhea

PHARMACOKINETICS

Half-life 1.5 days, excreted in urine, protein binding 20%-30%

PO: Onset $^1/_2$-2 hr, peak 6-8 hr, duration 3-4 days

IV: Onset 5-30 min, peak 1-5 hr, duration variable

INTERACTIONS

Increase: toxicity—azole antifungals, macrolides, tetracyclines, ritonavir

Increase: hypercalcemia, hypomagnesemia, digoxin toxicity—thiazides, parenteral calcium

Increase: hypokalemia, digoxin toxicity—diuretics, amphotericin B, carbenicillin, ticarcillin, corticosteroids

Increase: digoxin levels—propantheline, quiNIDine, verapamil, amiodarone, anticholinergics, diltiazem, NIFEdipine, indomethacin

Increase: bradycardia—β-adrenergic blockers, antidysrythmics

Increase: cardiac dysrhythmia risk—sympathomimetics
Decrease: digoxin absorption—antacids, kaolin/pectin, cholestyramine, metoclopramide
Decrease: digoxin level—thyroid agents, cholestyramine, colestipol, metoclopramide, aMILoride
Drug/Herb
Decrease: product effect—St. John's wort
Drug/Lab Test
Increase: CPK

NURSING CONSIDERATIONS

Assess:
• Apical pulse for 1 min before giving product; if pulse <60 in adult or <90 in infant, take again in 1 hr; if <60 in adult, call prescriber; note rate, rhythm, character; monitor ECG continuously during parenteral loading dose
• Electrolytes: potassium, sodium, chloride, magnesium, calcium; renal function studies: BUN, creatinine; blood studies: ALT, AST, bilirubin, Hct, Hgb before initiating treatment and periodically thereafter
• Monitor product levels; therapeutic level 0.5-2 ng/ml
Evaluate:
• Therapeutic response: decreased weight, edema, pulse, respiration, crackles; increased urine output; serum digoxin level (0.5-2 ng/ml)
Teach patient/family:
• Not to stop product abruptly; about all aspects of product; to take exactly as ordered; how to monitor heart rate
• To avoid OTC medications, herbal remedies because many adverse product interactions may occur; not to take antacid at same time
• To notify prescriber of loss of appetite, lower stomach pain, diarrhea, weakness, drowsiness, headache, blurred or yellow vision, rash, depression, toxicity
• About the toxic symptoms of this product; when to notify prescriber
• To maintain a sodium-restricted diet as ordered
• To use one brand consistently

TREATMENT OF OVERDOSE:

Discontinue product; give potassium; monitor ECG; give adrenergic-blocking agent, digoxin immune FAB

D

digoxin immune FAB (ovine) (Rx)

(di-jox'in im-myoon' FAB)

DigiFab

Func. class.: Antidote—digoxin specific

ACTION: Antibody fragments bind to free digoxin or digitoxin to reverse toxicity by not allowing digoxin or digitoxin to bind to sites of action

USES: Life-threatening digoxin toxicity

CONTRAINDICATIONS: Mild digoxin toxicity, hypersensitivity to this product, papain or ovine protein
Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, renal/cardiac disease, allergy to ovine proteins, hypocalcemia, heart failure

DOSAGE AND ROUTES

1 (38-mg) vial binds 0.5 mg digoxin; 1 (40 mg) DigiFab binds 0.5 mg digoxin
Digoxin toxicity (known amount) (tabs, oral sol, IM)
• **Adult and child: IV** dose (mg) = dose ingested (mg) × 0.8/1000 × 38- or 40-mg vial
Toxicity (known amount) (cap, IV)
• **Adult and child: IV** dose = dose ingested (mg)/0.5 × 38- or 40-mg vial
Toxicity (known amount) by serum digoxin concentrations (SDCs)
• **Adult and child: IV** SDC (ng/ml) × kg of weight/100 × 38- or 40-mg vial
Digoxin toxicity (unknown amount)
• **Adult and child >20 kg: IV** 228 mg (6 vials)

• **Infant and child <20 kg: IV** 38 mg (1 vial)

Acute ingestion

• **Adult: IV** 380 mg (10 vials)

Life-threatening ingestion

• **Adult: IV** 760 mg (20 vials)

Skin test

• **Adult: ID** 9.5 mcg

Available forms: Inj 38 mg/vial (binds 0.5 mg digoxin), 40 mg/vial (binds 0.5 mg digoxin)

Administer:

• Test doses proven to be ineffective in the general population; only use test dose in those with known allergies or those previously treated with digoxin immune FAB

• **For test dose** dilute 0.1 ml of reconstituted product (9.5 mg/ml) in 9.9 ml sterile isotonic saline, inj 0.1 ml (1:100 dilution) ID and observe for wheal with erythema; read in 20 min

• **For scratch test,** place 1 gtt of sol on skin, make a scratch through the drop with a sterile needle; read in 20 min

• After diluting 38 mg/4 ml of sterile water for inj 10 mg/ml mix; may be further diluted with normal saline; sol should be clear, colorless

• By bolus if cardiac arrest is imminent or IV over 30 min using a 0.22-μm filter

SIDE EFFECTS

CV: CHF, ventricular rate increase, atrial fibrillation, low cardiac output, hypotension

INTEG: *Hypersensitivity,* allergic reactions, facial swelling, redness, phlebitis

META: Hypokalemia

MISC: Anaphylaxis (rare)

RESP: Impaired respiratory function, rapid respiratory rate

PHARMACOKINETICS

IV: Peaks after completion of inf; onset 30 min (variable); not known if crosses placenta, breast milk; half-life biphasic: 14-20 hr, prolonged with renal disease; excreted by kidneys

INTERACTIONS

• Considered incompatible with all products in syringe or sol

Drug/Lab Test

Interference: immunoassay digoxin

NURSING CONSIDERATIONS

Assess:

• **Hypokalemia:** ST depression, flat T waves, presence of U wave, ventricular dysrhythmia; potassium levels may decrease rapidly

• **CHF:** dyspnea, crackles, peripheral edema, B/P, volume overload

Perform/provide:

• Storage of reconstituted sol for up to 4 hr in refrigerator

• Do not freeze DigiFab

Evaluate:

• Therapeutic response: correction of digoxin toxicity; check digoxin levels 0.5-2 ng/ml; digitoxin level 9-25 ng/ml

Teach patient/family:

• About the purpose of medication; to report delayed hypersensitivity: fever, chills, itching, swelling, dyspnea

⚠ HIGH ALERT

diltiazem (Rx)

(dil-tye'a-zem)

Cardizem, Cardizem CD, Cardizem LA, Cartia XT, Dilacor-XR, Dilt-CD, Diltia XR, Diltia XT, Diltzac, Taztia XT, Tiazac

Func. class.: Calcium channel blocker, antiarrhythmic class IV, antihypertensive

Chem. class.: Benzothiazepine

Do not confuse:

Cardizem/Cardene

ACTION: Inhibits calcium ion influx across cell membrane during cardiac depolarization; produces relaxation of coronary vascular smooth muscle, di-

lates coronary arteries, slows SA/AV node conduction times, dilates peripheral arteries

USES: **PO** angina pectoris due to coronary artery spasm, hypertension, **IV** atrial fibrillation, flutter, paroxysmal supraventricular tachycardia
Unlabeled uses: Unstable angina, proteinuria, cardiomyopathy, diabetic neuropathy

CONTRAINDICATIONS: Sick sinus syndrome, AV heart block, hypotension <90 mm Hg systolic, acute MI, pulmonary congestion, cardiogenic shock
Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, CHF, aortic stenosis, bradycardia, GERD, hepatic disease, hiatal hernia, ventricular dysfunction

DOSAGE AND ROUTES

Prinzmetal's or variant angina, chronic stable angina
• **Adult: PO** 30 mg qid, increasing dose gradually to 180-360 mg/day in divided doses or (SR) 60-120 mg bid; may increase to 240-360 mg/day or 120 or 180 mg **EXT REL** (LA, CD, XT, XR products) **PO** daily
Atrial fibrillation/flutter, paroxysmal supraventricular tachycardia
• **Adult: IV BOL** 0.25 mg/kg over 2 min initially then 0.35 mg/kg may be given after 15 min; if no response, may give **CONT INF** 5-15 mg/hr for up to 24 hr
Hypertension
• **Adult: PO** or 120-240 mg **(EXT REL once-daily dosing)** daily or 60-120 mg bid **(SUS REL twice-daily dosing)**
Rapid ventricular rate secondary to dysrhythmias (unlabeled)
• **Adolescent/child/infant >7 mo: IV BOL** 0.25 mg/kg over 5 min then **CONT IV INF** 0.11 mg/kg/hr
Available forms: Tabs 30, 60, 90, 120 mg; ext rel tabs 120, 180, 240, 300, 360, 420 mg; ext rel caps 60, 90, 120, 180, 240, 300, 360, 420 mg; inj 5 mg/ml (5, 10 ml)
Administer:
PO route
• **Cardiazem LA** ext rel tab 24 hr: give daily, either AM or PM, without regard to meals
• **Dilacor XR/Diltia XT** ext rel cap 24 hr: give daily; take on empty stomach; swallow whole; do not cut, crush, chew, open
• **Tiazac, Tiztia XT:** give daily without regard to meals
• **Conventional regular-rel tab:** give before meals, at bedtime
• **Cardizem CD or equivalent (Cartia XT):** generic ext rel cap 24 hr: give daily, without regard to meals
• May crush, sprinkle regular tab on applesauce for administration
Oral suspension (unlabeled)
• Grind 16 90-mg diltiazem regular rel tab into fine powder
• In separate container, mix 60 ml Ora-Sweet and 60 ml Ora-Plus
• Add small amount of sol to powder to form paste, add geometric amounts of base to achieve desired vol, place in amber container
Direct IV route
• IV undiluted over 2 min
Continuous IV INF route
• Diluted 125 mg/100 ml, 250 mg/250 ml of D_5W, 0.9% NaCl, D_5/0.45% NaCl, give 10 mg/hr, may increase by 5 mg/hr to 15 mg/hr, continue inf up to 24 hr

Y-site compatibilities: Albumin, amikacin, amphotericin B, aztreonam, bumetanide, ceFAZolin, cefotaxime, cefoTEtan, cefOXitin, cefTAZidime, cefTRIAXone, cefuroxime, cimetidine, ciprofloxacin, clindamycin, digoxin, DOBUTamine, DOPamine, doxycycline, EPINEPHrine, erythromycin, esmolol, fentaNYL, fluconazole, gentamicin, hetastarch, HYDROmorphone, imipenem-cilastatin, labetalol, lidocaine, LORazepam, meperidine, metoclopramide, metroNIDAZOLE, midazolam, milrinone,

morphine, multivitamins, niCARdipine, nitroglycerin, norepinephrine, oxacillin, penicillin G potassium, pentamidine, piperacillin, potassium chloride, potassium phosphates, ranitidine, sodium nitroprusside, theophylline, ticarcillin, ticarcillin/clavulanate, tobramycin, trimethoprim-sulfamethoxazole, vancomycin, vecuronium

SIDE EFFECTS

CNS: *Headache, fatigue, drowsiness,* dizziness, depression, weakness, insomnia, tremor, paresthesia
CV: Dysrhythmia, *edema,* CHF, bradycardia, hypotension, palpitations, heart block
GI: *Nausea,* vomiting, diarrhea, gastric upset, *constipation,* increased LFTs
GU: Nocturia, polyuria, acute renal failure
INTEG: *Rash,* flushing, photosensitivity, burning, pruritus at inj site
RESP: Rhinitis, dyspnea, pharyngitis

PHARMACOKINETICS

Onset 30-60 min; peak 2-3 hr immediate rel, 10-14 hr ext rel, 6-11 hr sus rel; half-life 3½-9 hr; metabolized by liver; excreted in urine (96% as metabolites)

INTERACTIONS

Increase: effect, toxicity—theophylline
Increase: effects of β-blockers, digoxin, lithium, carBAMazepine, cycloSPORINE, anesthetics, HMG-CoA reductase inhibitors, benzodiazepines, lovastatin, methylPREDNISolone
Increase: effects of diltiazem—cimetidine

NURSING CONSIDERATIONS

Assess:
- **CHF:** dyspnea, weight gain, edema, jugular venous distention, rales; monitor I&O ratios daily, weight
- **Angina:** location, duration, alleviating factors, activity when pain starts
- **Dysrhythmias:** cardiac status: B/P, pulse, respiration, ECG and intervals PR, QRS, QT; if systolic B/P <90 mm Hg or HR <50 bpm, hold dose, notify prescriber

Perform/provide:
- Storage in tight container at room temp

Evaluate:
- Therapeutic response: decreased anginal pain, decreased B/P

Teach patient/family:
- How to take pulse, B/P before taking product; that a record or graph should be kept
- To avoid hazardous activities until stabilized on product, dizziness is no longer a problem
- To limit caffeine consumption; to avoid grapefruit juice
- To avoid OTC products unless directed by prescriber
- About the importance of complying with all areas of medical regimen: diet, exercise, stress reduction, product therapy
- To change position slowly
- ⚠ To report dizziness, SOB, palpitations
- Not to discontinue abruptly

TREATMENT OF OVERDOSE:

Atropine for AV block, vasopressor for hypotension

dimenhyDRINATE (OTC, Rx)

(dye-men-hye'dri-nate)
Apo-Dimenhydrinate ✤, Dramamine, Driminate, Gravol ✤

Motion Sickness

TripTone, Wal-Dram
Func. class.: Antiemetic, antihistamine, anticholinergic
Chem. class.: H_1-receptor antagonist, ethanolamine derivative

Do not confuse:
dimenhyDRINATE/diphenhydrAMINE

ACTION: Competes with histamine for H_1 receptors in GI tract, blood vessels,

respiratory tract; central anticholinergic activity, which results in decreased vestibular stimulation and blockade of chemoreceptor trigger zone

USES: Motion sickness, nausea, vomiting, vertigo
Unlabeled uses: Hyperemesis gravidarum, Ménière's syndrome

CONTRAINDICATIONS: Hypersensitivity, infants, neonates, tartrazine dye hypersensitivity
Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, cardiac dysrhythmias, asthma, prostatic hypertrophy, bladder-neck obstruction, closed-angle glaucoma, stenosing peptic ulcer, pyloroduodenal obstruction

DOSAGE AND ROUTES

- **Adult: PO** 50-100 mg q4hr; **IM/IV** 50 mg q4hr as needed (Canada only)
- **Child 6-12 yr: PO** 25-50 mg q6-8hr prn, max 150 mg/day
- **Child 2-5 yr: PO** 12.5-25 mg q6-8hr, max 75 mg/day

Available forms: Tabs 50 mg; inj 50 mg/ml ♣; elixir 15 mg/5 ml ♣; chew tabs 50 mg
Administer:
- IM inj in large muscle mass; aspirate to avoid IV administration (Canada only)
- Tablets may be swallowed whole, chewed, or allowed to dissolve

IV route (Canada only)
- After diluting 50 mg/10 ml of NaCl inj, give ≤50 mg over 2 min

SIDE EFFECTS

CNS: *Drowsiness,* restlessness, headache, dizziness, insomnia, confusion, nervousness, tingling, vertigo
CV: Hypertension, *hypotension,* palpitation
EENT: *Dry mouth,* blurred vision, diplopia, nasal congestion, photosensitivity, xerostomia
GI: Nausea, anorexia, vomiting, *constipation*
INTEG: Rash, urticaria, fever, chills, flushing
MISC: Anaphylaxis

PHARMACOKINETICS

PO/IM: Onset 15-30 min, duration 4-6 hr

INTERACTIONS

Increase: effect—alcohol, anticholinergic, tricyclics, MAOIs, opiates, sedative/hypnotics, other CNS depressants
Drug/Lab Test
False negative: allergy skin testing

NURSING CONSIDERATIONS

Assess:
- VS, B/P; check patients with cardiac disease more often
- **Signs of toxicity** of other products or masking of symptoms of disease: brain tumor, intestinal obstruction
- Observe for drowsiness, dizziness

Evaluate:
- Therapeutic response: absence of nausea, vomiting, or vertigo

Teach patient/family:
- To avoid hazardous activities, activities requiring alertness because dizziness may occur; to request assistance with ambulation
- To avoid alcohol, other CNS depressants

dinoprostone (Rx)

(dye-noe-prost'one)
Cervidil, Prepidil, Prostin E-2
Func. class.: Oxytocic, abortifacient
Chem. class.: Prostaglandin E_2

Do not confuse:
Prepidil/bepridil

ACTION: Stimulates uterine contractions, causing abortion; acts within 30 hr for complete abortion

USES: Abortion during 2nd trimester, benign hydatidiform mole, expulsion of

uterine contents in fetal deaths to 28 wk, missed abortion, to efface and dilate the cervix in pregnancy at term

CONTRAINDICATIONS:

Hypersensitivity, C-section, surgery, fetal distress, multiparity, vaginal bleeding, cephalopelvic disproportion

Precautions: Pregnancy (C), cardiac/renal/hepatic disease, asthma, anemia, jaundice, diabetes mellitus, seizure disorders, hypertension, glaucoma, uterine fibrosis, cervical stenosis, pelvic surgery, pelvic inflammatory disease, respiratory disease

Black Box Warning: Requires a specialized setting and an experienced clinician

DOSAGE AND ROUTES

Abortifacient/2nd trimester/missed abortion/benign hydatidiform mole/intrauterine fetal death

• **Adult: VAG SUPP** 20 mg, repeat q3-5hr until abortion occurs, max dose is 240 mg

Cervical ripening

• **Adult: GEL** 0.5 mg vag gel placed in cervical canal, may repeat after 6 hr, max 1.5 mg/24 hr; vag insert 10 mg high in vagina, remove at onset of active labor or within 12 hr

Available forms: VAG SUPP 20 mg; gel 0.5 mg/3 g (prefilled syringe); vag insert 10 mg

Administer:

• **By gel:** after warming to room temp, remove seal from end of syringe, remove protective end cap and insert into plunger stopper assembly; make sure patient is in dorsal position; **insert:** must be kept frozen until use

• Antiemetic/antidiarrheal before administration of this product

SIDE EFFECTS

CNS: *Headache,* dizziness, chills, fever, flushing

CV: Hypotension, dysrhythmias, DIC

EENT: Blurred vision

SYST: Anaphylactoid syndrome of pregnancy

FETAL: Bradycardia (i.e., deceleration)

GI: *Nausea, vomiting, diarrhea*

GU: Vaginitis, vaginal pain, vulvitis, vaginismus

INTEG: Rash, skin color changes

MS: *Leg cramps, joint swelling,* weakness

GEL: Uterine contractile abnormality, GI side effects, back pain, fever

INSERT: Uterine hyperstimulation, fever, nausea, vomiting, diarrhea, abdominal pain

SUPPOSITORY: Uterine rupture, anaphylaxis

INTERACTIONS

Increase: effect—other oxytocics

Decrease: oxytocic effect—alcohol

PHARMACOKINETICS

Metabolized in spleen, kidney, lungs; excreted in urine

GEL: Onset 10 min, peak 30-45 min

SUPP: Onset 10 min, duration 2-3 hr

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Specialized setting, specialized clinician: use only with emergency equipment nearby, by a clinician experienced when used in pregnancy termination; complete abortion should result within 17 hr

• **Cervical ripening:** dilation, effacement of cervix and uterine contraction, fetal heart tones, check for contractions over 1 min

• For fever that occurs ½ hr after suppository insertion (abortion)

• Respiratory rate, rhythm, depth; notify prescriber of abnormalities, pulse, B/P, temp

• **Vaginal discharge:** check for itching, irritation; indicates vaginal infection

Evaluate:

• Therapeutic response: expulsion of fetus

Teach patient/family:

• To remain supine for 10-15 min after

insertion of supp, 2 hr after insert, 15-30 min after gel
- To report excessive cramping, bleeding, chills, fever
- About some methods of pain, comfort control
- To avoid intercourse, tub baths, douches, tampon use for at least 2 wk

diphenhydrAMINE (OTC, Rx)

(dye-fen-hye'dra-meen)

Allerdryl ♣, AllerMax ♣, Altaryl, Banophen, Benadryl, Benadryl Allergy, Benadryl Allergy Dye Free, Benadryl Children's Allergy, Buckley's Bedtime, Diphedryl, Diphenhist, Dytan, ElixSure Allergy, Equaline Allergy, Equaline Children's Allergy, Equate Allergy, Equate Children's Allergy, Genahist, Good Sense Children's Allergy Relief, Good Sense Diphedryl, Leader Complete Allergy, Nytol, PediaCare Children's Allergy, PediaCare Nighttime Cough, Q-Dryl Allergy, Select Brand Allergy, Siladryl, Silphen, Simply Sleep, Sleepinal, Sleep Tabs, Sominex, Top Care Allergy, Top Care Children's Allergy, Unisom ♣, Valu-Dryl, Wal-dryl Allergy, Wal-dryl Allergy Dye Free, Wal-dryl Children's Allergy, Walgreen's Sleep Aid, Walgreen's Sleep II, Wal-Som

Func. class.: Antihistamine (1st generation, nonselective)

Chem. class.: Ethanolamine derivative, H_1-receptor antagonist

Do not confuse:
diphenhydrAMINE/dicyclomine
diphenhydrAMINE/dimenhyDRINATE

ACTION: Acts on blood vessels, GI, respiratory system by competing with histamine for H_1-receptor site; decreases allergic response by blocking histamine

USES: Allergy symptoms, rhinitis, motion sickness, antiparkinsonism, nighttime sedation, infant colic, nonproductive cough, insomnia in children
Unlabeled uses: Nystagmus

CONTRAINDICATIONS: Hypersensitivity to H_1-receptor antagonist, acute asthma attack, lower respiratory tract disease, neonates
Precautions: Pregnancy (B), breastfeeding, children <2 yr, increased intraocular pressure, cardiac/renal disease, hypertension, bronchial asthma, seizure disorder, stenosed peptic ulcers, hyperthyroidism, prostatic hypertrophy, bladder neck obstruction

DOSAGE AND ROUTES

- **Adult and child >12 yr: PO** 25-50 mg q4-6hr, max 300 mg/day; **IM/IV** 10-50 mg, max 300 mg/day
- **Child 6-12 yr: PO/IM/IV** 5 mg/kg/day in 4 divided doses, max 300 mg/day

Nighttime sleep aid
- **Adult and child ≥12 yr: PO** 25-50 mg at bedtime

Antitussive (syrup only)
- **Adult and child ≥12 yr: PO** 25 mg q4hr, max 150 mg/24 hr
- **Child 6-12 yr: PO** 12.5 mg q4hr, max 75 mg/24 hr

Renal disease
- CCr >50 ml/min, dose q6hr; CCr 10-50 ml/min, dose q6-12hr; CCr <10 ml/min, dose q12-18hr

Peripheral vestibular nystagmus (unlabeled)
- **Adult: PO** 25-50 mg q4-6hr up to 48 hr

Available forms: Caps 25, 50 mg; tabs 25, 50 mg; chew tabs 12.5 mg; elix 12.5 mg/5 ml; syr 12.5 mg/5 ml; inj 10, 50 mg/ml; orally disintegrating tabs 12.5, 25 mg

Administer:

⚠ Avoid use in children <2 yr; death has occurred; overdose has occurred with topical gel taken orally (adult/child)

- With meals for GI symptoms; absorption rate may slightly decrease
- At bedtime only if using for sleep aid

IM route

- Deep IM in large muscle; rotate site

Direct IV route

- Undiluted; give 25 mg/min or less

Intermittent IV INF route

- Dilute with 0.9% NaCl, 0.45% NaCl, D_5W, 0.9% NaCl, $D_{10}W$, LR, Ringer's

Syringe compatibilities: Atropine, butorphanol, chlorproMAZINE, cimetidine, dimenhyDRINATE, droperidol, fentaNYL, fluPHENAZine, glycopyrrolate, HYDROmorphone, hydrOXYzine, meperidine, metoclopramide, midazolam, morphine, nalbuphine, pentazocine, perphenazine, prochlorperazine, promazine, promethazine, ranitidine, scopolamine, SUFentanil

Y-site compatibilities: Abciximab, aldesleukin, alfentanil hydrochloride, amifostine, amikacin sulfate, aminocaproic acid, amphotericin B lipid complex (Abelcet), amphotericin B liposome (AmBisome), amsacrine, anidulafungin, argatroban, ascorbic acid injection, atenolol, atracurium besylate, atropine sulfate, azithromycin, benztropine mesylate, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, caspofungin, ceftAZidime, ceftizoxime, chlorproMAZINE, cimetidine, ciprofloxacin, cisatracurium, CISplatin, cladribine, clindamycin, codeine, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, digoxin, diltiazem, DOBUTamine, docetaxel, DOPamine, doripenem, doxacurium, DOXOrubicin, DOXOrubicin liposomal, doxycycline, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, epoetin alfa, eptifibatide, ertapenem, erythromycin, esmolol, etoposide, famotidine, fenoldopam, fentaNYL, filgrastim, fluconazole, fludarabine, folic acid, gallium, gatifloxacin, gemcitabine, gemtuzumab, gentamicin, glycopyrrolate, granisetron, HYDROmorphone, hydrOXYzine, IDArubicin, ifosfamide, imipenem-cilastatin, irinotecan, isoproterenol, labetalol, levofloxacin, lidocaine, linezolid, LORazepam, LR, magnesium sulfate, mannitol, mechlorethamine, melphalan, meperidine, meropenem, metaraminol, methadone, methicillin, methotrexate, methoxamine, methyldopate, metoclopramide, metoprolol, metroNIDAZOLE, miconazole, midazolam, minocycline, mitoXANtrone, morphine, multiple vitamins injection, mycophenolate, nalbuphine, naloxone, nesiritide, netilmicin, nitroglycerin, norepinephrine, octreotide, ondansetron, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pamidronate, pancuronium, papaverine, PEMEtrexed, penicillin G potassium/sodium, pentamidine, pentazocine, phenylephrine, phytonadione, piperacillin, piperacillin-tazobactam, polymyxin B, potassium chloride, procainamide, prochlorperazine, promethazine, propofol, propranolol, protamine, pyridoxine, quiNIDine, quinupristin-dalfopristin, ranitidine, remifentanil, Ringer's, ritodrine, riTUXimab, rocuronium, sargramostim, sodium acetate, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiamine, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, TNA, tobramycin, tolazoline, TPN, trastuzumab, trimetaphan, urokinase, vancomycin, vasopressin, vecuronium, verapamil, vinCRIStine, vinorelbine, vitamin B complex/C, voriconazole, zoledronic acid

SIDE EFFECTS

CNS: *Dizziness, drowsiness,* poor coordination, fatigue, anxiety, euphoria, confusion, paresthesia, neuritis, seizures

CV: Hypotension, palpitations

EENT: Blurred vision, dilated pupils, tinnitus, nasal stuffiness, dry nose, throat, mouth

GI: Nausea, anorexia, diarrhea
GU: *Retention,* dysuria, frequency
HEMA: Thrombocytopenia, agranulocytosis, hemolytic anemia
INTEG: Photosensitivity
MISC: Anaphylaxis
RESP: Increased thick secretions, wheezing, chest tightness

PHARMACOKINETICS

Metabolized in liver, excreted by kidneys, crosses placenta, excreted in breast milk, half-life 2-7 hr
PO: Peak 1-3 hr, duration 4-7 hr
IM: Onset ½ hr, peak 1-4 hr, duration 4-7 hr
IV: Onset immediate, duration 4-7 hr

INTERACTIONS

Increase: CNS depression—barbiturates, opiates, hypnotics, tricyclics, alcohol
Increase: diphenhydrAMINE effect—MAOIs
Drug/Lab Test
False negative: skin allergy tests

NURSING CONSIDERATIONS

Assess:
• Urinary retention, frequency, dysuria; product should be discontinued
• CBC during long-term therapy; blood dyscrasias may occur
• Respiratory status: rate, rhythm, increase in bronchial secretions, wheezing, chest tightness
• Product should be discontinued 4 days before skin allergy tests
• Storage in tight container at room temp
Evaluate:
• Therapeutic response: absence of running or congested nose or rashes, improved sleep
Teach patient/family:
• About all aspects of product use; to notify prescriber of confusion, sedation, hypotension
• To avoid driving, other hazardous activity if drowsiness occurs
• That photosensitivity may occur
• To avoid concurrent use of alcohol, other CNS depressants
• To avoid breastfeeding; not to breastfeed (injectable)
• To use hard candy, gum, frequent rinsing of mouth for dryness

TREATMENT OF OVERDOSE:

Administer diazepam, vasopressors, phenytoin IV

D

diphenoxylate/atropine (Rx)

(dye-fen-ox'ee-late/a'troe-peen)
Lomotil, Lonox

difenoxin/atropine (Rx)

(dye-fen-ox'in/a'troe-peen)
Motofen
Func. class.: Antidiarrheal
Chem. class.: Phenylpiperidine derivative opiate agonist

Controlled Substance Schedule V

diphenoxylate/atropine

Controlled Substance Schedule IV

difenoxin/atropine (US)
Do not confuse:
Lomotil/LaMICtal/LamISIL/Lanoxin/Lasix/Ludomil

ACTION: Inhibits gastric motility by acting on mucosal receptors responsible for peristalsis

USES: Acute nonspecific and acute exacerbations of chronic functional diarrhea

CONTRAINDICATIONS: Children <2 yr, hypersensitivity, pseudomembranous colitis, severe electrolyte imbalances, diarrhea associated with organisms that penetrate intestinal mucosa

Precautions: Pregnancy (C), breastfeeding, hepatic disease, ulcerative colitis, severe hepatic disease, substance abuse, dehydration

DOSAGE AND ROUTES

Diphenoxylate/atropine

- **Adult: PO** 5 mg qid titrated to patient response needed, max 8 tabs/day
- **Child 2-12 yr: PO** (liquid only) 0.3-0.4 mg/kg/day in 4 divided doses

Difenoxin/atropine

- **Adult: PO** 2 tabs then 1 tab after each loose stool or q3-4hr prn, max 8 tabs/day

Available forms: Diphenoxylate/atropine: tabs 2.5 mg with atropine 0.025 mg; liquid 2.5 mg with atropine 0.025 mg/5 ml; **difenoxin/atropine:** tabs 1 mg difenoxin/0.025 atropine

Administer:

- For 48 hr only; if no response, product should be discontinued

SIDE EFFECTS

CNS: *Dizziness, drowsiness, lightheadedness, headache,* fatigue, nervousness, insomnia, confusion
EENT: Burning eyes, blurred vision
GI: *Nausea, vomiting, dry mouth, epigastric distress,* constipation, paralytic ileus, toxic megacolon
MISC: Anaphylaxis, angioedema
RESP: Respiratory depression

PHARMACOKINETICS

PO: Onset 40-60 min, peak 2 hr, duration 3-4 hr, terminal half-life 12-14 hr, metabolized in liver to active metabolite; excreted in urine and feces

INTERACTIONS

- Do not use with MAOIs; hypertensive crisis may occur

Increase: action of alcohol, opioids, barbiturates, other CNS depressants, anticholinergics
Decrease: GI motility, possible toxic megacolon—amantadine, antimuscarinics, amoxapine, diphenhydrAMINE, clozAPine, clemastine, cyclobenzaprine, loperamide, maprotiline, phenothiazines, tricyclics, disopyramide, OLANZapine

NURSING CONSIDERATIONS

Assess:

- Electrolytes (potassium, sodium, chlorine) if receiving long-term therapy
- Bowel pattern before; for rebound constipation after termination of medication; bowel sounds
- Response after 48 hr; if none, product should be discontinued
- **Abdominal distention, toxic megacolon;** may occur in ulcerative colitis
- Hepatic studies if receiving long-term therapy

Evaluate:

- Therapeutic response: decreased diarrhea

Teach patient/family:

- To avoid OTC products unless directed by prescriber (may contain alcohol); not to use alcohol or CNS depressants
- Not to exceed recommended dose
- That product may be habit forming
- Not to engage in hazardous activities; that drowsiness may occur; not to use for longer than 48 hr for acute diarrhea

dipivefrin ophthalmic

See Appendix B

dipyridamole (Rx)

(dye-peer-id'a-mole)
Persantine
Func. class.: Coronary vasodilator, antiplatelet agent
Chem. class.: Nonnitrate

ACTION: Inhibits adenosine uptake, which produces coronary vasodilation; increases oxygen saturation in coronary tissues, coronary blood flow; acts on small resistance vessels with little effect on vascular resistance; may increase de-

velopment of collateral circulation; decreases platelet aggregation by the inhibition of phosphodiesterase (an enzyme)

USES: Prevention of transient ischemic attacks, inhibition of platelet adhesion to prevent myocardial reinfarction, thromboembolism, with warfarin in prosthetic heart valves, prevention of coronary bypass graft occlusion with aspirin; IV form used to evaluate CAD; used as alternative to exercise with thallium myocardial perfusion imaging to evaluate CAD

Unlabeled uses: Cardiomyopathy, MI prophylaxis, proteinuria, TIA, valvular heart disease

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (B), breastfeeding, hypotension

DOSAGE AND ROUTES

Inhibition of platelet adhesion

• **Adult: PO** 75-100 mg qid in combination with aspirin or warfarin

Thallium myocardial perfusion imaging

• **Adult: IV** 570 mcg/kg

TIA with aspirin (unlabeled)

• **Adult: PO** 225-400 mg/day max 400 mg/day

Available forms: Tabs 25, 50, 75 mg; inj 10 mg/2 ml

Administer:

PO route

• On empty stomach: 1 hr before meals or 2 hr after; give with 8 oz water for better absorption

IV route

• IV after diluting to at least 1:2 ratio using D_5W, 0.45% NaCl, or 0.9% NaCl to a total vol of 20-50 ml; give over 4 min; do not give undiluted

• Inject thallium 201 within 5 min after product infusion

• Do not admix

SIDE EFFECTS

CNS: *Headache, dizziness, weakness, fainting, syncope;* IV: transient cerebral ischemia, weakness

CV: *Postural hypotension;* IV: MI

GI: *Nausea, vomiting,* anorexia, diarrhea

INTEG: *Rash,* flushing

RESP: IV: Bronchospasm

PHARMACOKINETICS

PO: Peak 1.25 hr, duration 6 hr, therapeutic response may take several months, metabolized in liver, excreted in bile, undergoes enterohepatic recirculation, protein binding 91%-99%, terminal half-life 12 hr

INTERACTIONS

• Prevention of coronary vasodilation: theophylline

Increase: digoxin effect—digoxin

Increase: bleeding risk—NSAIDs, cefamandole, cefoTEtan, cefoperazone, plicamycin, valproic acid, salicylates, sulfinpyrazole, anticoagulants, thrombolytics

NURSING CONSIDERATIONS

Assess:

• B/P, pulse during treatment until stable; take B/P lying, standing; orthostatic hypotension is common

• Cardiac status: chest pain; what aggravates, ameliorates condition

Perform/provide:

• Storage at room temp

Evaluate:

• Therapeutic response: decreased platelet adhesion

Teach patient/family:

• That medication is not a cure; may have to be taken continuously in evenly spaced doses only as directed

• To avoid hazardous activities until stabilized on medication; dizziness may occur

• To rise slowly from sitting or lying to prevent orthostatic hypotension

• Not to use alcohol or OTC medications unless approved by prescriber

DOBUTamine (Rx)

(doe-byoo'ta-meen)

Func. class.: Adrenergic direct-acting β_1-agonist, cardiac stimulant

Chem. class.: Catecholamine

Do not confuse:
DOBUTamine/DOPamine

ACTION: Causes increased contractility, increased cardiac output without marked increase in heart rate by acting on β_1-receptors in heart; minor α and β_2 effects

USES: Cardiac decompensation due to organic heart disease or cardiac surgery
Unlabeled uses: Cardiogenic shock in children; congenital heart disease in children undergoing cardiac catheterization

CONTRAINDICATIONS: Hypersensitivity, idiopathic hypertrophic subaortic stenosis
Precautions: Pregnancy (B), breastfeeding, children, hypertension, CAD, MI, hypovolemia, dysrhythmias, sulfite hypersensitivity, renal failure, geriatric patients

DOSAGE AND ROUTES

• **Adult and child: IV INF** 0.5-1 mcg/kg/min; titrate to 2-20 mcg/kg/min may increase to 40 mcg/kg/min if needed
Available forms: Inj 12.5 mg/ml, 250 mg/20 ml
Administer:
Injectable
• Visually inspect parenteral products for particulate matter and discoloration before administration whenever solution and container permit
IV route

Note: Infusions ≤72 hr have been given without development of tolerance. However, beta-receptor desensitization can occur with prolonged infusions of any beta-adrenergic agonist, including DOBUTamine, or as a consequence of sympathetic compensatory mechanisms associated with advanced congestive heart failure, resulting in alterations in DOBUTamine pharmacodynamics. Experience with intravenous DOBUTamine in controlled trials does not extend beyond 48 hr of repeated boluses and/or continuous infusions.

• Must be diluted before administration
• Infuse into a large vein
Dilution
• Concentrate for injection must be diluted with ≥50 ml of a compatible IV solution (strongly alkaline [e.g., sodium bicarbonate] solutions are incompatible). A common dilution is 500 mg (40 ml) in 210 ml D_5W or NS (withdraw 40 ml from a 250 ml bag) to produce a final concentration of 2000 mcg/ml; or 1000 mg (80 ml) in 170 ml D_5W or NS (withdraw 80 ml from a 250 ml bag) to produce a final concentration of 4000 mcg/ml. Maximum concentration should not exceed 5000 mcg/ml and should be adjusted according to the patient's fluid requirements.
Infusion
• Administer diluted solution by IV inf using a controlled-infusion device.
• Premixed bags of DOBUTamine in D_5W solutions can exhibit a pink color that increase with time. This color change is due to slight oxidation of the drug, but there is no significant loss of potency
• Do not administer DOBUTamine simultaneously with solutions containing sodium bicarbonate or strong alkaline solutions (incompatible)
• Infusion of DOBUTamine should be started at a low rate and titrated frequently to reach the optimal dosage (see Dosage). Dosage titration is guided by the patient's response, including systemic blood pressure, urine flow, frequency of ectopic activity, heart rate, and (whenever possible) measurements of cardiac output, central venous pressure, and/or pulmonary capillary wedge pressure

Y-site compatibilities: Alfentanil, alprostadil, amifostine, amikacin, aminocaproic acid, amiodarone, anidulafun-

gin, argatroban, ascorbic acid injection, atenolol, atracurium, atropine, aztreonam, benztropine, bleomycin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, caspofungin, chlorproMAZINE, cimetidine, ciprofloxacin, cisatracurium, CISplatin, cladribine, clarithromycin, cloNIDine, codeine, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexmedetomidine, digoxin, diltiazem, diphenhydrAMINE, DOCEtaxel, DOPamine, doripenem, doxacurium, DOXOrubicin, DOXOrubicin liposomal, doxycycline, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, epoetin alfa, eptifibatide, erythromycin, esmolol, etoposide, famotidine, fenoldopam, fentaNYL, fluconazole, fludarabine, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, HYDROmorphone, hydrOXYzine, IDArubicin, ifosfamide, irinotecan, isoproterenol, labetalol, levofloxacin, lidocaine, linezolid, LORazepam, LR, magnesium sulfate, mannitol, mechlorethamine, meperidine, meropenem, metaraminol, methoxamine, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, miconazole, milrinone, minocycline, mitoXANtrone, morphine, multiple vitamins injection, mycophenolate mofetil, nafcillin, nalbuphine, naloxone, netilmicin, niCARdipine, nitroglycerin, norepinephrine, octreotide, ondansetron, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pamidronate, pancuronium, papaverine, pentamidine, pentazocine, phenylephrine, polymyxin B, potassium chloride, procainamide, prochlorperazine, promethazine, propofol, propranolol, protamine, pyridoxine, quiNIDine, ranitidine, remifentanil, Ringer's, ritodrine, riTUXimab, rocuronium, sodium acetate, succinylcholine, SUFentanil, tacrolimus, temocillin, teniposide, theophylline, thiamine, thiotepa, tigecycline, tirofiban, TNA, tobramycin, tolazoline, TPN, trastuzumab, trimetaphan, urokinase, vancomycin, vasopressin, vecuronium, verapamil, vinCRIStine, vinorelbine, voriconazole, zidovudine, zoledronic acid

SIDE EFFECTS

CNS: *Anxiety,* headache, dizziness, fatigue

CV: Palpitations, tachycardia, hyper/hypotension, PVCs, angina

ENDO: Hypokalemia

GI: Heartburn, nausea, vomiting

MS: Muscle cramps (leg)

RESP: Dyspnea

PHARMACOKINETICS

IV: Onset 1-2 min, peak 10 min, half-life 2 min, metabolized in liver (inactive metabolites), excreted in urine

INTERACTIONS

Increase: severe hypertension—guanethidine

Increase: dysrhythmias—general anesthetics

Increase: pressor effect, dysrhythmias—atomoxetine, COMT inhibitors, tricyclics, MAOIs, oxytocics

Decrease: DOBUTamine action—other β-blockers

NURSING CONSIDERATIONS

Assess:

- **Hypovolemia;** if present, correct first; administer cardiac glycoside before DOBUTamine
- **Oxygenation/perfusion deficit:** check B/P, chest pain, dizziness, loss of consciousness
- **Heart failure:** S_3 gallop, dyspnea, neck venous distention, bibasilar crackles in patients with CHF, cardiomyopathy, palpate peripheral pulses; report if extremities become cold or mottled or if peripheral pulses decrease
- **ECG** during administration continuously; if B/P increases, product is decreased; CVP or PCWP, cardiac output during inf; report changes
- Serum electrolytes, urine output

Sulfite sensitivity, which may be life threatening

Perform/provide:

• Storage of reconstituted sol for 24 hr if refrigerated

Evaluate:

• Therapeutic response: increased B/P with stabilization, increased urine output

Teach patient/family:

• About the reason for product administration; to report dyspnea, chest pain, numbness of extremities, headache, IV site discomfort

TREATMENT OF OVERDOSE:

Administer a β_1-adrenergic blocker; reduce IV or discontinue, ensure oxygenation/ventilation; for severe tachydysrhythmias (ventricular), give lidocaine or propranolol

DOCEtaxel (Rx)

(doe-se-tax'el)

Taxotere

Func. class.: Antineoplastic—miscellaneous

Chem. class.: Taxane

Do not confuse:

Taxotere/Taxol

ACTION:

Inhibits reorganization of microtubule network needed for interphase and mitotic cellular functions; also causes abnormal bundles of microtubules during cell cycle and multiple esters of microtubules during mitosis

USES:

Locally advanced or metastatic breast cancer, non–small-cell lung cancer, androgen-independent metastatic prostate cancer, postsurgery operable node-positive breast cancer, induction treatment of locally advanced squamous cell of the head and neck

Unlabeled uses: Malignant melanoma, ovarian cancer, front-line use with bevacizumab for metastatic breast cancer, adjuvant treatment of breast cancer with CARBOplatin and trastuzumab, gastric adenocarcinoma

CONTRAINDICATIONS:

Pregnancy (D), breastfeeding, hypersensitivity to this product, bilirubin exceeding upper normal limit

Black Box Warning: Other products with polysorbate 80, neutropenia of $<1500/mm^3$

Precautions: Children, cardiovascular disease, pulmonary disorders, bone marrow depression, herpes zoster, pleural effusion

Black Box Warning: Edema, hepatic disease, lung cancer, taxane hypersensitivity

DOSAGE AND ROUTES:

• Other regimens are used

Locally advanced or metastatic breast cancer after failure of other chemotherapy

• **Adult: IV** 60-100 mg/m^2 given over 1 hr q3wk; if neutrophil count is <500 cells/mm^3 for >1 wk, reduce dose by 25%

Operable node-positive breast cancer, adjuvant postsurgery treatment of operable node-positive breast cancer

• **Adult: IV** (TAC regimen) 75 mg/m^2 1 hr after DOXOrubicin 50 mg/m^2 and cyclophosphamide 500 mg/m^2 q3wk × 6 cycles

Adjuvant treatment of operable stage I-III invasive breast cancer in combination with cyclophosphamide

• **Adult: IV** (TAC regimen) docetaxel 75 mg/m^2 with cyclophosphamide 600 mg/m^2 q21days × 4 cycles

Locally advanced or metastatic non–small-cell lung cancer after failure of CISplatin chemotherapy

• **Adult: IV** 75 mg/m^2 over 1 hr q3wk; if neutrophil count is <500 cells/mm^3 for >1 wk, reduce dose to 55 mg/m^2; if patient develops grade 3 peripheral neuropathy, stop product

Unreactable, locally advanced, or metastatic non–small-cell lung cancer previously treated with chemotherapy

• **Adult: IV** 75 mg/m² over 1 hr then CISplatin 75 mg/m² **IV** given over 30-60 min q3wk; reduce dose to 65 mg/m² in those with hematologic or non-hematologic toxicities

Androgen-independent metastatic prostate cancer

• **Adult: IV** 75 mg/m² given over 1 hr q3wk with 5 mg predniSONE **PO** bid continuously; give dexamethasone 8 mg **PO** at 12 hr, 3 hr, and 1 hr prior to docetaxel; if neutrophil count is <500 cells/mm³ for more than 1 wk or other toxicities occur, reduce dose to 60 mg/m²

Squamous cell of head and neck

• **Adult: IV** 75 mg/m² over 1 hr, then CISplatin 100 mg/m² over 1 hr on day 1, then 5FU 1000 mg/m²/day **CONT INF** × 5 days, repeat cycle q3wk

Gastric adenocarcinoma

• **Adult: IV** 75 mg/m² q3wk, given with CISplatin, fluorouracil

Advanced ovarian cancer/ metastatic melanoma (unlabeled)

• **Adult: IV** 100 mg/m² over 1 hr q3wk

Available forms: Inj 20 mg/0.5 ml, 20 mg/ml, 80 mg/2 ml, 80 mg/4 ml

Administer:

• Premedicate with dexamethasone 8 mg **PO** bid × 3 days starting 1 day prior to treatment

• Antiemetic 30-60 min before product and prn

Intermittent IV INF route

• Use cytotoxic handling procedures

• Use non-PVC bag and use non-DEHP tubing

• Allow vials to warm to room temp; withdraw all diluent, inject in vial of docetaxel; rotate gently to mix; allow to stand to decrease foaming, then withdraw the required amount (10 mg/ml), inject in 250 ml of 0.9% NaCl, D_5W; mix gently; give over 1 hr

Y-site compatibilities: Acyclovir, alfentanil, allopurinol, amifostine, amikacin, aminocaproic acid, aminophylline, amiodarone, amphotericin B lipid complex, ampicillin, ampicillin-sulbactam, anidulafungin, atenolol, atracurium, azithromycin, aztreonam, bivalirudin, bleomycin, bumetanide, buprenorphine, busulfan, butorphanol, calcium chloride/gluconate, CARBOplatin, carmustine, caspofungin, ceFAZolin, cefepime, cefonicid, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, cefTAZidime, ceftizoxime, cefTRIAXone, cefuroxime, cephapirin, chloramphenicol, chlorproMAZINE, cimetidine, ciprofloxacin, cisatracurium, CISplatin, clindamycin, codeine, cyclophosphamide, cycloSPORINE, cytarabine, dacarbazine, DACTINomycin, DAPTOmycin, dexamethasone, dexmedetomidine, dexrazoxane, diazepam, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOPamine, doripenem, doxacurium, DOXOrubicin HCL, doxycycline, droperidol, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, ertapenem, erythromycin, esmolol, etoposide, famotidine, fenoldopam, fentaNYL, fluconazole, fludarabine, fluorouracil, foscarnet, fosphenytoin, furosemide, ganciclovir, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, haloperidol, heparin, hydrALAZINE, hydrocortisone, HYDROmorphone, hydrOXYzine, ifosfamide, imipenem-cilastatin, inamrinone, insulin (regular), irinotecan, isoproterenol, ketorolac, labetalol, leucovorin, levofloxacin, levorphanol, lidocaine, linezolid, LORazepam, LR, magnesium sulfate, mannitol, meperidine, meropenem, mesna, methotrexate, methyldopate, metoclopramide, metoprolol, metroNIDAZOLE, midazolam, milrinone, minocycline, mitoXANtrone, mivacurium, morphine, nafcillin, naloxone, nesiritide, netilmicin, niCARdipine, nitroglycerin, nitroprusside, norepinephrine, octreotide, ofloxacin, ondansetron, oxaliplatin, palonosetron, pamidronate, pancuronium, pantoprazole, PEMEtrexed, pentamidine,

pentazocine, PENTobarbital, PHENobarbital, phenylephrine, piperacillin, piperacillin-tazobactam, polymyxin B, potassium chloride/phosphates, procainamide, prochlorperazine, promethazine, propranolol, quiNIDine, quinupristin-dalfopristin, ranitidine, remifentanil, riTUXimab, rocuronium, sodium acetate/bicarbonate/phosphates, succinylcholine, SUFentanil, sulfamethoxazole-trimethoprim, tacrolimus, teniposide, theophylline, thiopental, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, tobramycin, tolazoline, trastuzumab, trimethobenzamide, vancomycin, vasopressin, vecuronium, verapamil, vinCRIStine, vinorelbine, voriconazole, zidovudine, zoledronic acid

SIDE EFFECTS

CNS: Seizures
CV: *Hypotension, fluid retention, peripheral edema,* flushing, MI, sinus tachycardia
GI: *Nausea, vomiting, diarrhea,* hepatotoxicity, stomatitis, colitis
HEMA: Neutropenia, leukopenia, thrombocytopenia, anemia, bleeding, infections, myelosuppression
INTEG: *Alopecia,* nail pain, rash, skin eruptions
MISC: Amenorrhea, fever of unknown origin, secondary malignancy, Stevens-Johnson syndrome
MS: *Artbralgia, myalgia,* back pain, weakness
NEURO: *Peripheral neuropathy*
RESP: Dyspnea, pulmonary edema, fibrosis, embolism
SYST: *Hypersensitivity reactions*

PHARMACOKINETICS

Metabolized in liver, excreted in feces, terminal half-life 11.1 hr

INTERACTIONS

Increase: CYP3A inhibition: anastrozole (high doses), aprepitant, fosaprepitant, clarithromycin, conivaptan, delavirdine, efavirenz (induces or inhibits), erythromycin, fluconazole, FLUoxetine, fluvoxaMINE, imatinib, itraconazole, ketoconazole, mibefradil, nefazodone, voriconazole, and others
Increase: CYP3A induction: barbiturates, bosentan, carBAMazepine, nevirapine, phenytoin, fosphenytoin, rifabutin, rifampin, rifapentine, troglitazone
Increase: myelosuppression—other antineoplastics, radiation
Decrease: immune response—live virus vaccines

NURSING CONSIDERATIONS

Assess:

Black Box Warning: CBC, differential, platelet count before treatment and weekly; withhold product if WBC is $<1500/mm^3$ or platelet count is $<100,000/mm^3$; notify prescriber

Black Box Warning: DOCEtaxel, polysorbate 80 hypersensitivity: contraindicated

Black Box Warning: Edema: oral corticosteroids should be given as premedication, assess for fluid retention

Black Box Warning: Lung cancer: increased mortality in those with increased LFTs and a history of platinum-based products

• Monitor temp; fever may indicate beginning of infection

Black Box Warning: **Hepatic disease:** hepatic studies before, during therapy (bilirubin, AST, ALT, LDH) prn or monthly; check for jaundiced skin and sclera, dark urine, clay-colored stools, itchy skin, abdominal pain, fever, diarrhea

• **CNS changes:** confusion, paresthesias, peripheral neuropathy, dysethenia, pain, weakness; if severe, product should be discontinued

• VS during 1st hr of inf, check IV site for signs of infiltration

Black Box Warning: **Hypersensitive reactions, anaphylaxis,** including hypotension, dyspnea, angioedema, generalized urticaria; discontinue infusion immediately

• **Bone marrow depression/bleeding:** hematuria, guaiac, bruising or petechiae, mucosa or orifices q8hr; obtain prescription for viscous lidocaine (Xylocaine); avoid invasive procedures
• Effects of alopecia on body image; discuss feelings about body changes
Perform/provide:
• Confirmation that dexamethasone was given 12 hr and 6 hr before inf begins
• Storage of prepared sol up to 27 hr in refrigerator
Evaluate:
• Therapeutic response: decreased tumor size, spread of malignancy
Teach patient/family:
• To report signs of **infection:** fever, sore throat, flulike symptoms
• To report signs of **anemia:** fatigue, headache, faintness, SOB, irritability
• To report **bleeding;** to avoid use of razors, commercial mouthwash
• To avoid use of aspirin, ibuprofen
• That hair may be lost during treatment; that a wig or hairpiece may make patient feel better; that new hair may be different in color and texture
• That pain in muscles and joints 2-5 days after inf is common
• To use barrier contraception during and for several months after treatment, pregnancy (D); to avoid breastfeeding
• To avoid receiving vaccinations while taking product

docosanol topical

See Appendix B

docusate calcium (OTC)

(dok'yoo-sate cal'see-um)

Kao-Tin, Stool Softener DC, Sur-Q-Lax, Walgreen's Stool Softener

docusate sodium (OTC)

Colace, Correctol, Diocto, Doc-Q-Lace, Docu DOK, Doculace, Enemeez, Equaline Stool Softener, Good Sense Stool Softener, Leader Stool Softener, Phillip's Stool Softener, Regulex ♣, Select Brand Docusate Sodium, Selex ♣, Silace, Soflax ♣, Top Care Stool Softener, Walgreen's Stool Softener

Func. class.: Laxative, emollient; stool softener

Chem. class.: Anionic surfactant

ACTION: Increases water, fat penetration in intestine; allows for easier passage of stool

USES: Prevention of dry, hard stools

CONTRAINDICATIONS: Hypersensitivity, obstruction, fecal impaction, nausea/vomiting
Precautions: Pregnancy (C), breastfeeding

DOSAGE AND ROUTES

• **Adult: PO** 50-300 mg/day (sodium) or 240 mg (calcium) prn; **ENEMA** 4 ml
• **Child >12 yr: ENEMA** 2 ml
• **Child 6-12 yr: PO** 40-150 mg/day (sodium) in divided doses
• **Child 3-6 yr: PO** 20-60 mg/day (sodium) in divided doses
• **Child <3 yr: PO** 10-40 mg/day (sodium) in divided doses
Available forms: *Calcium:* 240 mg; *sodium:* caps 50, 100, 250 mg; tabs 100 mg; syr 20 mg/5 ml, 50 mg/15 ml, 100

mg/30 ml, 150 mg/15 ml; oral sol 10, 50 mg/ml; enema 283 mg/3.9 cap

Administer:

- Swallow tabs whole; do not break, crush, or chew
- Oral sol: diluted in milk, fruit juice to decrease bitter taste
- In morning or evening (oral dose)

SIDE EFFECTS

EENT: Bitter taste, throat irritation
GI: Nausea, anorexia, cramps, diarrhea
INTEG: Rash

PHARMACOKINETICS

Onset 12-72 hr

INTERACTIONS

- **Toxicity:** mineral oil

Drug/Herb

Increase: laxative action—flax, senna

NURSING CONSIDERATIONS

Assess:

- **Cause of constipation;** identify whether fluids, bulk, or exercise missing from lifestyle; constipating products
- Cramping, rectal bleeding, nausea, vomiting; if these occur, product should be discontinued

Perform/provide:

- Storage in cool environment; do not freeze

Evaluate:

- Therapeutic response: decrease in constipation

Teach patient/family:

- That normal bowel movements do not always occur daily
- Not to use in presence of abdominal pain, nausea, vomiting
- To notify prescriber if constipation unrelieved or if symptoms of electrolyte imbalance occur: muscle cramps, pain, weakness, dizziness, excessive thirst
- That product may take up to 3 days to soften stools
- To take oral preparations with a full glass of water (unless on fluid restrictions) and to increase fluid intake

dofetilide (Rx)

Tikosyn

Func. class.: Antidysrhythmic (Class III)

ACTION: Blocks cardiac ion channel carrying the rapid component of delayed potassium current; no effect on sodium channels

USES: Atrial fibrillation, flutter, maintenance of normal sinus rhythm

CONTRAINDICATIONS: Children, hypersensitivity, digoxin toxicity, aortic stenosis, pulmonary hypertension, severe renal disease

Black Box Warning: QT prolongation, torsades de pointes, renal failure

Precautions: Pregnancy (C), breastfeeding, AV block, bradycardia, electrolyte imbalance

Black Box Warning: Renal disease, arrhythmias

DOSAGE AND ROUTES

Conversion of atrial fibrillation/atrial flutter to normal sinus rhythm; maintenance therapy with highly symptomatic atrial fibrillation/atrial flutter of ≥1 week duration

- **Adult: PO** Individualize dosage based on renal function and QTc in a monitored facility. Refer to the step-by-step procedure for determining the initial dosage of dofetilide

Maintenance therapy of atrial fibrillation/atrial flutter after hospital discharge

- **Adult: PO** Continue dosage at discharge as from initial dosage titration. Individualize dosage based on renal function and QTc, which should be reevaluated every 3 months or as medically warranted; if the QTc >500 msec (550 msec in patients with ventricular conduc-

tion abnormalities) at any time, discontinue; carefully monitor until QTc returns to baseline; if renal function deteriorates, adjust the dosage as described in the dosage guidelines for patients with renal impairment.

Discontinuation of dofetilide before use of interacting drugs

• **Adult: PO** Discontinue dofetilide for ≥2 days before starting a potentially interacting drug

Renal dose

• **Adult: PO** CCr >60 ml/min, 500 mcg bid; CCr 40-60 ml/min, 250 mcg bid; CCr 20-39 ml/min, 125 mcg bid; CCr <20 ml/min, do not use

Available forms: Caps 125, 250, 500 mcg

Administer:

Black Box Warning: Step 1: Assess cardiac conduction: Before first dose, the QTc interval must be determined using an average of 5–10 beats; if the QTc interval is >440 msec (or >500 msec in ventricular conduction abnormalities), do not use. If baseline heart rate is <60 bpm, then the QT interval should be used

Black Box Warning: Step 2: Assess renal function: Before first dose, determine renal function using the Cockroft-Gault equation, use actual body weight to calculate creatinine clearance

Black Box Warning: Step 3: Adjust starting dose according to renal function: Refer to the "Patients with renal impairment" section (below) to determine the appropriate initial dosage

Black Box Warning: Step 4: ECG monitoring: Begin continuous ECG monitoring starting with the first dose

Black Box Warning: Step 5: Dosage adjustments: Approximately 2–3 hr after the first dose, determine the QTc interval. If the QTc interval has increased by >15% (compared to baseline), or if the QTc interval is >500 msec (>550 msec in patients with ventricular conduction abnormalities), the initial dosage should be reduced by half as follows:

• Decrease an initial dose of 500 mcg bid to 250 mcg bid
• Decrease an initial dose of 250 mcg bid to 125 mcg bid
• Decrease an initial dose of 125 mcg bid to 125 mcg/day

Black Box Warning: Step 6: Reassess QTc interval: Reassess the QTc interval 2–3 hr after each subsequent dose; if the QTc interval lengthens to >500 msec (or >550 msec in patients with ventricular conduction abnormalities), *discontinue*

Black Box Warning: Step 7: ECG monitoring: Monitor continuous ECG for a minimum of 3 days or for 12 hr after conversion to normal sinus rhythm, whichever is greater

SIDE EFFECTS

CNS: *Syncope, dizziness,* headache, stroke
CV: *Hypotension, postural hypotension, bradycardia,* angina, PVCs, substernal pressure, transient hypertension, precipitation of angina, QT prolongation, torsades de pointes, ventricular dysrhythmias
GI: *Nausea, vomiting,* severe diarrhea, anorexia
MISC: Angioedema
RESP: Dyspnea, respiratory infections

PHARMACOKINETICS

Well absorbed, max plasma conc 2-3 hr, steady state 2-3 days, half-life 10 hr, metabolized by liver, excreted by kidneys

INTERACTIONS

• Do not use with cimetidine, ketoconazole, verapamil, prochlorperazine, trimethoprim-sulfamethoxazole, megestrol, hydrochlorothiazide
Increase: QT prolongation, torsades de pointes—class IA/III antidysrhythmics, arsenic trioxide, chloroquine, clarithromycin, droperidol, erythromycin, halofantrine, haloperidol, levomethadyl, methadone, pentamidine, some phenothiazines, ziprasidone

Increase: hypokalemia—potassium-depleting diuretics
Increase: toxicity—amiloride metFORMIN, entecavir, lamiVUDine, memantine, triamterene, procainamide, trospium
Increase: dofetilide levels—antiretroviral protease inhibitors
Drug/Food
• Do not use with grapefruit juice

NURSING CONSIDERATIONS

Assess:
• AF patients should receive anticoagulation prior to cardioversion
• Cardiac status: rate, rhythm, character, continuously; B/P

Black Box Warning: **Severe renal impairment CCr <20 ml/min:** do not use for mild to moderate renal disease; monitor BUN/creatinine; adjust dose based on creatinine clearance

Perform/provide:
• Place patient in supine position unless otherwise ordered; assist with ambulation
Evaluate:
• Therapeutic response: control of atrial fibrillation
Teach patient/family:
• To make position changes slowly; orthostatic hypotension may occur
• To notify prescriber if fast heartbeats with fainting or dizziness occur
• To notify all prescribers of all medications, supplements taken
• That if dose is missed, not to double; to take next dose at usual time
• To avoid breastfeeding

dolasetron (Rx)

(do-la'se-tron)

Anzemet

Func. class.: Antiemetic
Chem. class.: 5-HT3 receptor antagonist

ACTION

Prevents nausea, vomiting by blocking serotonin peripherally, centrally, and in the small intestine

USES

Prevention of nausea, vomiting associated with cancer chemotherapy, radiotherapy; prevention of postoperative nausea, vomiting
Unlabeled uses: Radiotherapy-induced nausea/vomiting

CONTRAINDICATIONS

Hypersensitivity
Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, hypokalemia, electrolyte imbalances; granisetron/ondansetron/palonosetron hypersensitivity, QT prolongation

DOSAGE AND ROUTES

Prevention of nausea and vomiting during cancer chemotherapy
• **Adult: PO** 100 mg 1 hr before chemotherapy
• **Child 2-16 yr: PO** 1.8 mg/kg before chemotherapy; max 100 mg
Prevention of postoperative nausea and vomiting
• **Adult: IV** 12.5 mg as single dose 15 min before cessation of anesthesia; **PO** 100 mg 2 hr before surgery (prevention only)
• **Child 2-16 yr: IV** 0.35 mg/kg as single dose 15 min before cessation of anesthesia; **PO** 1.2 mg/kg 2 hr before surgery (prevention only)
Available forms: Tabs 50, 100 mg; inj 20 mg/ml (12.5 mg/0.625 ml)
Administer:
PO route
• Do not mix product for oral administration in apple or apple-grape juice until immediately before administration; diluted product can be kept for 2 hr at room temp
Intermittent IV INF route
• By inj 100 mg/30 sec or more or diluted in 50 ml compatible sol; give over 15 min
• Do not admix

SIDE EFFECTS

CNS: *Headache,* dizziness, fatigue, drowsiness

CV: Dysrhythmias, ECG changes, hypo/hypertension, tachycardia, bradycardia; ventricular tachycardia/fibrillation, QT prolongation, torsades de pointes, cardiac arrest (IV)
GI: *Diarrhea*, constipation, increased AST/ALT, abdominal pain, anorexia
GU: Urinary retention, oliguria
MISC: Rash, bronchospasm

PHARMACOKINETICS

Well absorbed, metabolized to active metabolite, half-life of active metabolite 8 hr, max concentrations after 1 hr

INTERACTIONS

• **QT Prolongation:** QRS, PR prolongation; do not use in those with congenital long QT syndrome, hypokalemia, hypomagnesemia, complete heart block (unless a pacemaker is in place), correct electrolytes before use, monitor ECG in elderly patients, renal cardiac disease
Increase: dysrhythmias—antidysrhythmics
Increase: dolasetron levels—cimetidine
Increase: QT prolongation—thiazide/loop diuretics, antidysrhythmics—class IA, III, arsenic trioxide, chloroquine, clarithromycin, droperidol, erythromycin, halofantrine, haloperidol, levomethadyl, methadone, pentamidine, some phenothiazines, ziprasidone; occurs at higher dose of dolasetron
Decrease: dolasetron levels—rifampin

NURSING CONSIDERATIONS

Assess:
• For absence of nausea, vomiting during chemotherapy
• **Hypersensitivity reaction:** rash, bronchospasm
• Cardiac conduction conditions, electrolyte imbalances, dysrhythmias, heart rate
Perform/provide:
• Storage at room temp 48 hr after dilution
Evaluate:
• Therapeutic response: absence of nausea, vomiting during cancer chemotherapy
Teach patient/family:
• To report diarrhea, constipation, nausea, vomiting, rash, or changes in respirations
• May cause headache; use analgesic

D

donepezil (Rx)

(don-ep-ee'zill)

Aricept, Aricept ODT

Func. class.: Anti-Alzheimer's agent
Chem. class.: Reversible cholinesterase inhibitor

ACTION: Elevates acetylcholine concentrations (cerebral cortex) by slowing degradation of acetylcholine released in cholinergic neurons; does not alter underlying dementia

USES: Mild to severe dementia with Alzheimer's disease
Unlabeled uses: Subcortical, vascular dementia; dementia with Lewy bodies

CONTRAINDICATIONS: Hypersensitivity to this product or piperidine derivatives
Precautions: Pregnancy (C), breastfeeding, children, sick sinus syndrome, history of ulcers, GI bleeding, hepatic disease, bladder obstruction, asthma, seizures, COPD, abrupt discontinuation, AV block, GI obstruction, Parkinson's disease, surgery

DOSAGE AND ROUTES

• **Adult: PO** 5 mg/day at bedtime; may increase to 10 mg/day after 4-6 wk, may increase to 23 mg/day after 3 mo of 10 mg/day
Available forms: Tabs 5, 10, 23 mg; orally disintegrating tabs (Aricept ODT) 5, 10 mg

Administer:
- Daily in the evening before bedtime; swallow whole; do not cut, break, chew, or crush tab
- Dosage adjusted to response no more than q4-6wk; oral dosage forms are interchangeable
- **Orally disintegrating tabs:** allow to dissolve on tongue before swallowing; may be given with/without water

SIDE EFFECTS

CNS: Dizziness, *insomnia,* somnolence, *headache,* fatigue, abnormal dreams, syncope, seizures, drowsiness, agitation, depression, confusion, fever, hallucinations
CV: Atrial fibrillation, hypo/hypertension, sinus bradycardia, AV block
GI: *Nausea, vomiting,* anorexia, *diarrhea,* abdominal pain, GI bleeding, weight loss
GU: Urinary frequency, UTI, incontinence
INTEG: Rash, flushing, diaphoresis, bruising
META: Hyperlipidemia
MS: Cramps, arthritis, arthralgia
RESP: Rhinitis, URI, cough, pharyngitis, dyspnea

PHARMACOKINETICS

Well absorbed PO; metabolized by CYP2D6, CYP3A4; elimination half-life 10 hr single dose, 70 hr multiple doses; protein binding 96%

INTERACTIONS

Increase: donepezil effects—CYP2D6, CYP3A4 inhibitors
Increase: synergistic effect—succinylcholine, cholinesterase inhibitors, cholinergic agonists
Increase: gastric acid secretions—NSAIDs
Decrease: donepezil effects—CYP2D6, CYP3A4 inducers
Decrease: action of anticholinergics
Decrease: donepezil effect—carBAMazepine, dexamethasone, phenytoin, PHENobarbital, rifampin

Drug/Herb
Decrease: donepezil—St. John's wort

NURSING CONSIDERATIONS

Assess:
- B/P: hypo/hypertension, heart rate
- Mental status: affect, mood, behavioral changes, depression, complete suicide assessment; neurologic status
- GI status: nausea, vomiting, anorexia, diarrhea; monitor weight
- GU status: urinary frequency, incontinence, I&O

Perform/provide:
- Assistance with ambulation during beginning therapy; dizziness, ataxia may occur

Evaluate:
- Therapeutic response: decrease in confusion, improved mood

Teach patient/family:
- To report side effects: twitching, nausea, vomiting, sweating, dizziness; indicates cholinergic crisis or overdose
- To use product exactly as prescribed
- To notify prescriber of nausea, vomiting, diarrhea (dose increase or beginning treatment), or rash
- Not to increase or abruptly decrease dose; serious consequences may result
- That product is not a cure, relieves symptoms

⚠ HIGH ALERT

DOPamine (Rx)

(doe'pa-meen)
Func. class.: Adrenergic
Chem. class.: Catecholamine

Do not confuse:
DOPamine/DOBUTamine

ACTION: Causes increased cardiac output; acts on β_1- and α-receptors, causing vasoconstriction in blood vessels; low dose causes renal and mesenteric vasodilation; β_1 stimulation produces inotropic effects with increased cardiac output

USES: Shock, increased perfusion, hypotension, cardiogenic/septic shock
Unlabeled uses: Bradycardia, cardiac arrest, CPR, acute renal failure, cirrhosis, barbiturate intoxication

CONTRAINDICATIONS: Hypersensitivity, ventricular fibrillation, tachydysrhythmias, pheochromocytoma, hypovolemia
Precautions: Pregnancy (C), breastfeeding, geriatric patients, arterial embolism, peripheral vascular disease, sulfite hypersensitivity, acute MI
Black Box Warning: Extravasation

DOSAGE AND ROUTES

Shock
- **Adult: IV INF** 2-5 mcg/kg/min, titrate upward in 5-10 mcg/kg/min increments, max 50 mcg/kg/min; titrate to patient's response
- **Child: IV** 1-5 mcg/kg/min initially; usual dosage range, 2-20 mcg/kg/min

COPD
- **Adult: IV** 4 mcg/kg/min

CHF
- **Adult: IV** 3-10 mcg/kg/min

Bradycardia (unlabeled)
- **Adult: IV** 2-10 mcg/kg/min, titrate as needed

Available forms: Inj 40 mg, 80 mg, 160 mg/ml; conc for IV inf 0.8, 1.6, 3.2 mg/ml in 250, 500 ml D_5W

Administer:

IV route
- IV after diluting 200-400 mg/250-500 ml of D_5W, D_5 0.45% NaCl, D_5 0.9% NaCl, D_5LR, LR; use large vein
- After reconstituting, use inf pump; give at rate of 0.5-5 mcg/kg/min, increase by 1-4 mcg/kg/min at 10-30 min intervals until desired response

Black Box Warning: Extravasation: if extravasation occurs, stop infusion, may inject area with phentolamine 10 mg/15 ml of NS

Y-site compatibilities: Alfentanil, alprostadil, amifostine, amikacin, aminocaproic acid, aminophylline, amiodarone, anidulafungin, argatroban, ascorbic acid injection, atenolol, atracurium, atropine, aztreonam, benztropine, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, caspofungin, cefamandole, cefmetazole, cefonicid, cefotaxime, cefoTEtan, cefOXitin, cefpirome, cefTAZidime, ceftizoxime, cefTRIAXone, cefuroxime, chlorproMAZINE, cimetidine, ciprofloxacin, cisatracurium, CISplatin, cladribine, clarithromycin, clindamycin, cloNIDine, codeine, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, dexmedetomidine, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, doripenem, doxacurium, DOXOrubicin, DOXOrubicin liposomal, doxycycline, droperidol, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, epoetin alfa, eptifibatide, ertapenem, erythromycin, esmolol, etoposide, famotidine, fenoldopam, fentaNYL, fluconazole, fludarabine, fluorouracil, folic acid, foscarnet, gatifloxacin, gemcitabine, gemtuzumab, gentamicin, glycopyrrolate, granisetron, heparin, hydrocortisone, HYDROmorphone, hydrOXYzine, IDArubicin, ifosfamide, imipenem-cilastatin, irinotecan, isoproterenol, ketorolac, labetalol, levofloxacin, lidocaine, linezolid, LORazepam, LR, magnesium sulfate, mannitol, mechlorethamine, meperidine, metaraminol, methicillin, methoxamine, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, mezlocillin, micanfungin, miconazole, midazolam, milrinone, minocycline, mitoXANtrone, morphine, moxalactam, multiple vitamins injection, mycophenolate, nafcillin, nalbuphine, naloxone, netilmicin, niCARdipine, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxacillin, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pamidronate, pancuronium, pantoprazole, papaverine, PEMEtrexed, penicillin G potassium/sodium, pentamidine, pen-

tazocine, PENTobarbital, PHENobarbital, phenylephrine, phytonadione, piperacillin, piperacillin-tazobactam, polymyxin B, potassium chloride, procainamide, prochlorperazine, promethazine, propofol, propranolol, protamine, pyridoxine, quiNIDine, ranitidine, remifentanil, Ringer's, ritodrine, riTUXimab, rocuronium, sargramostim, sodium acetate, succinylcholine, SUFentanil, tacrolimus, temocillin, teniposide, theophylline, thiamine, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, TNA, tobramycin, tolazoline, TPN, trastuzumab, trimetaphan, urokinase, vancomycin, vasopressin, vecuronium, verapamil, vinCRIStine, vinorelbine, vitamin B complex/C, voriconazole, warfarin, zidovudine, zoledronic acid

SIDE EFFECTS

CNS: *Headache,* anxiety
CV: *Palpitations,* tachycardia, *hypertension, ectopic beats, angina,* wide QRS complex, peripheral vasoconstriction, hypotension
GI: *Nausea, vomiting, diarrhea*
INTEG: Necrosis, tissue sloughing with extravasation, gangrene
RESP: Dyspnea

PHARMACOKINETICS

IV: Onset 5 min; duration <10 min; metabolized in liver, kidney, plasma; excreted in urine (metabolites); half-life 2 min

INTERACTIONS

• Do not use within 2 wk of MAOIs; hypertensive crisis may result
Increase: bradycardia, hypotension—phenytoin
Increase: dysrhythmias—general anesthetics
Increase: severe hypertension—ergots
Increase: B/P—oxytocics
Increase: pressor effect—tricyclics, MAOIs
Decrease: DOPamine action—β-/α-blockers

Drug/Lab Test
Increase: urinary catecholamine, serum glucose

NURSING CONSIDERATIONS

Assess:
• Hypovolemia; if present, correct first
• **Oxygenation/perfusion deficit:** check B/P, chest pain, dizziness, loss of consciousness
• **Heart failure:** S_3 gallop, dyspnea, neck venous distention, bibasilar crackles in patients with CHF, cardiomyopathy, palpate peripheral pulses
• I&O ratio: if urine output decreases without decrease in B/P, product may need to be reduced
• **ECG** during administration continuously; if B/P increases, product should be decreased; PCWP, CVP during inf
• B/P, pulse q5min
• Paresthesias and coldness of extremities; peripheral blood flow may decrease
• Inj site: tissue sloughing; if this occurs, administer phentolamine mixed with NS
Perform/provide:
• Storage of reconstituted sol for up to 24 hr if refrigerated
• Do not use discolored sol; protect from light
Evaluate:
• Therapeutic response: increased B/P with stabilization; increased urine output
Teach patient/family:
• About the reason for product administration

TREATMENT OF OVERDOSE:

Discontinue IV, may give a short-acting α-adrenergic blocker

doripenem (Rx)

(dore-i-pen'em)

Doribax

Func. class.: Antiinfective—miscellaneous

Chem. class.: Carbapenem

ACTION: Bactericidal; interferes with cell-wall replication of susceptible organisms; osmotically unstable cell wall swells, bursts from osmotic pressure

USES: Serious infections caused by *Acinetobacter baumannii, Bacteroides caccae, Bacteroides fragilis, Bacteroides thetaiotaomicron, Bacteroides uniformis, Bacteroides vulgatus, Escherichia coli, Klebsiella pneumoniae, Peptostreptococcus micros, Proteus mirabilis, Pseudomonas aeruginosa, Streptococcus constellatus, Streptococcus intermedius*; complicated urinary tract infections, pyelonephritis, complicated intraabdominal infections

CONTRAINDICATIONS: Hypersensitivity to carbapenems (meropenem, doripenem, imipenem), penicillin, β-lactam; viral infection

Precautions: Pregnancy (B), breastfeeding, geriatric patients, renal disease, seizure disorder, pseudomembranous colitis, nebulizer or inhalation use

DOSAGE AND ROUTES

• **Adult: IV** 500 mg q8hr × 5-14 days; if improvement occurs after 3 days, switch to appropriate oral product

Renal dose

• **Adult: IV** CCr 30-50 ml/min, 250 mg over 1 hr, q8hr; CCr >10 to <30 ml/min, 250 mg over 1 hr q12hr; CCr ≤10 ml/min, no data

Available forms: Powder for inj 250, 500 mg

Administer:

IV route

• Visually inspect parenteral products for particulate matter and discoloration before use, diluted range in color from clear, colorless solutions to solutions that are clear and slightly yellow

• **Reconstitution:** No bacteriostatic preservative is present; observe aseptic technique while preparing the infusion

• **500-mg dose using the 500-mg vial**: Constitute the vial with 10 ml of sterile water for injection or sodium chloride 0.9% (normal saline). Gently shake (50 mg/ml); *the constituted suspension is not for direct injection; further dilution is required.* Using a syringe with a 21-G needle, withdraw the suspension and add it to an infusion bag containing 100 ml of NS or D_5W; gently shake until clear: final concentration: 4.5 mg/ml

• **250-mg dose using the 500 mg vial**: Constitute the vial with 10 ml of sterile water for injection or sodium chloride 0.9% (normal saline). Gently shake (50 mg/ml); *the constituted suspension is not for direct injection; further dilution is required.* Using a syringe with a 21-G needle, withdraw the suspension and add it to an infusion bag containing 100 ml of normal saline or D_5W; gently shake until clear; remove 55 ml of this solution and discard. The remaining inf sol contains 250 mg (4.5 mg/ml)

• **250-mg dose using the 250 mg vial**: Constitute the vial with 10 ml of sterile water for injection or sodium chloride 0.9% (normal saline). Gently shake (25 mg/ml); *the constituted suspension is not for direct injection; further dilution is required.* Using a syringe with a 21-G needle, withdraw the suspension and add it to an infusion bag containing 50 or 100 ml of normal saline or D_5W; gently shake until clear; final concentration 4.2 mg/ml (50 ml infusion bag) or 2.3 mg/ml (100 ml infusion bag)

• **Storage:** Constituted suspensions may be held in vial for up to 1 hr before

transfer and dilution in the infusion bag. Including storage and infusion time, diluted infusion sols are stable for up to 12 hr (NS) or 4 hr (D_5W) at controlled room temperature; diluted infusion sols are stable for up to 72 hr (NS) or 24 hr (D_5W) refrigerated, do not freeze constituted solutions.

- If Baxter Minibag Plus inf bags are to be used, consult the instructions provided by the inf bag manufacturer

Intermittent IV INF route

- After C&S is taken
- Do not mix with or physically add to solutions containing other drugs, infuse over 1 hr

Y-site compatibilities: Acyclovir, amikacin, aminophylline, amiodarone, anidulafungin, atropine, azithromycin, bumetanide, calcium gluconate, CARBOplatin, caspofungin, ceftobiprole, cimetidine, ciprofloxacin, CISplatin, cyclophosphamide, cycloSPORINE, DAPTOmycin, dexamethasone, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, DOXOrubicin, enalaprilat, esmolol, esomeprazole, etoposide, famotidine, fentaNYL, fluconazole, fluorouracil, foscarnet, furosemide, gemcitabine, gentamicin, granisetron, heparin, hydrocortisone, HYDROmorphone, ifosfamide, insulin (regular), labetalol, levofloxacin, linezolid, LORazepam, magnesium sulfate, mannitol, meperidine, methotrexate, methylPREDNISolone, metoclopramide, metroNIDAZOLE, micafungin, midazolam, milrinone, morphine, moxifloxacin, norepinephrine, ondansetron, PACLitaxel, pantoprazole, PHENobarbital, phenylephrine, potassium chloride, ranitidine, sodium bicarbonate/phosphates, tacrolimus, tigecycline, tobramycin, vancomycin, voriconazole, zidovudine

Solution compatibilities: D_5W, 0.9% NaCl, sterile water for inj

SIDE EFFECTS

CNS: Seizures, headache

GI: Diarrhea, nausea, vomiting, pseudomembranous colitis, hepatitis

HEMA: Neutropenia, leukopenia, anemia

INTEG: *Rash,* urticaria, phlebitis, erythema at inj site, Stevens-Johnson syndrome, toxic epidermal necrolysis, pruritus

SYST: Anaphylaxis

PHARMACOKINETICS

IV: Distributed to most body fluids/tissue, excreted mainly unchanged in urine, 70% recovered in 48 hr, half-life 1 hr, half-life extended in renal disease

INTERACTIONS

Increase: doripenem plasma levels—probenecid

Decrease: effect of valproic acid, divalproex sodium

Drug/Lab Test

Increase: AST, ALT, LDH, BUN, alk phos, bilirubin, creatinine

False positive: direct Coombs' test

NURSING CONSIDERATIONS

Assess:

- Sensitivity to carbapenem antibiotics, penicillins
- Renal disease: lower dose may be required
- Bowel pattern daily; if severe diarrhea occurs, product should be discontinued; may indicate pseudomembranous colitis
- For infection: temp; sputum; characteristics of wound before, during, and after treatment

Allergic reactions, anaphylaxis: rash, urticaria, pruritus; may occur few days after therapy begins

- **Overgrowth of infection:** perineal itching, fever, malaise, redness, pain, swelling, drainage, rash, diarrhea, change in cough, sputum

Evaluate:

- Therapeutic response: negative C&S; absence of symptoms and signs of infection

Teach patient/family:

- To report severe diarrhea; may indicate pseudomembranous colitis

• To report sore throat, bruising, bleeding, joint pain; may indicate blood dyscrasias (rare)
• To report overgrowth of infection: black, furry tongue; vaginal itching; foul-smelling stools
• To avoid breastfeeding; product is excreted in breast milk

TREATMENT OF HYPERSENSITIVITY: EPINEPHrine, antihistamines; resuscitate if needed (anaphylaxis)

dorzolamide (ophthalmic)

(dor-zole'ah-mide)

Trusopt

Func. class.: Antiglaucoma

Chem. class.: Carbonic anhydrase inhibitor

ACTION: Decreases aqueous humor secretion by decreasing bicarbonate, thus decreasing IOP

USES: For the treatment of elevated intraocular pressure in patients with ocular hypertension or open-angle glaucoma

CONTRAINDICATIONS: Hypersensitivity

Precautions: Hypersensitivity to sulfonamides, hepatic/renal disease, angle-closure glaucoma, electrolyte disturbances

DOSAGE AND ROUTES

Elevated intraocular pressure in patients with ocular hypertension or open-angle glaucoma

• Adult/adolescent/child/infant/neonate ≥1 wk: Ophthalmic Instill 1 drop of a 2% solution into the affected eye(s) tid

Available forms: Ophthalmic solution 2%

Administer:

• Wash hands before and after use, tilt the head back slightly and pull the lower eyelid down with the index finger to form a pouch, squeeze the prescribed number of drops into the pouch and gently close eyes for 1–2 min. Do not blink
• Care should be taken to avoid contamination, do not touch the tip of the dropper to the eye, fingertips, or other surface
• The sol may be used concomitantly with other topical ophthalmic drug products to lower IOP. If more than one topical ophthalmic drug is being used, administer ≥10 min apart

SIDE EFFECTS

CNS: Headache
EENT: Blurred vision, tearing, allergy, burning/stinging, photophobia
GI: Bitter taste

PHARMACOKINETICS

Onset 1-2 hr, peak 3 hr, duration 8 hr, half-life 4 mo

INTERACTIONS

Increase: effects—carbonic anhydrase inhibitors (PO), salicylates

NURSING CONSIDERATIONS

Assess:
• Hypersensitivity
• Monitor IOP during treatment

Evaluate:
• Decreasing IOP

Teach patient/family:
• How to use product
• Not to share with others or use for other conditions
• To notify prescriber immediately if vision changes or if condition worsens
• To take as prescribed

doxapram (Rx)

(dox'a-pram)

Dopram

Func. class.: Analeptic

ACTION: Respiratory stimulation through activation of peripheral carotid

chemoreceptor; with higher doses, medullary respiratory centers are stimulated; with progressive CNS stimulation

USES: Chronic obstructive pulmonary disease (COPD), postanesthesia respiratory depression, prevention of acute hypercapnia, product-induced CNS depression
Unlabeled uses: Neonatal apnea

CONTRAINDICATIONS: Hypersensitivity, seizure disorders, severe hypertension, severe bronchial asthma, severe dyspnea, severe cardiac disorders, flail chest, pneumothorax, PE, severe respiratory disease
Precautions: Pregnancy (B), breastfeeding, children, bronchial asthma, pheochromocytoma, severe tachycardia, dysrhythmias, hypertension, hyperthyroidism

DOSAGE AND ROUTES

Postanesthesia
• **Adult: IV** inj 0.5-1 mg/kg, not to exceed 1.5 mg/kg total as a single inj; **IV INF** 250 mg in 250 ml sol, not to exceed 4 mg/kg; run at 1-3 mg/min
Drug-induced CNS depression
• **Adult: IV** Priming dose of 2 mg/kg, repeated in 5 min; repeat q1-2hr until patient awakes; **IV INF** priming dose 2 mg/kg at 1-3 mg/min, not to exceed 3 g/day
COPD (hypercapnia)
• **Adult: IV INF** 1-2 mg/min, not to exceed 3 mg/min for no longer than 2 hr
Available forms: Inj 20 mg/ml

SIDE EFFECTS

CNS: Seizures (clonus/generalized), *headache,* restlessness, dizziness, confusion, paresthesias, flushing, sweating, bilateral Babinski's sign, rigidity, depression
CV: *Chest pain, hypertension, change in heart rate,* lowered T waves, tachycardia, dysrhythmias
EENT: Pupil dilation, sneezing
GI: Nausea, vomiting, diarrhea, desire to defecate
GU: Retention, incontinence, elevation of BUN, albuminuria
INTEG: Pruritus, irritation at inj site
RESP: Laryngospasm, bronchospasm, rebound hypoventilation, dyspnea, cough, tachypnea, hiccups

PHARMACOKINETICS

IV: Onset 20-40 sec, peak 1-2 min, duration 5-10 min, metabolized by liver, excreted by kidneys (metabolites), half-life 2.5-4 hr

INTERACTIONS

• Synergistic pressor effect: MAOIs, sympathomimetics
• Cardiac dysrhythmias: halothane, cyclopropane, enflurane; delay use of doxapram for at least 10 min after inhalation anesthetics

NURSING CONSIDERATIONS

Assess:
• BP, heart rate, deep tendon reflexes, ABGs, LOC before administration, q30min
• Po_2, Pco_2, O_2 saturation during treatment
• Hypertension, dysrhythmias, tachycardia, dyspnea, skeletal muscle hyperactivity; may indicate overdosage; discontinue product
• Respiratory stimulation: increased rate, abnormal rhythm
• Extravasation; change IV site q48hr
• Patient closely for ½-1 hr
Administer:
IV route
• Undiluted or diluted with equal parts of sterile water for inj; may be diluted 250 mg/250 ml of D_5W, $D_{10}W$ and run as inf; rapid inf may cause hemolysis
• IV undiluted over 5 min; IV inf at 1-3 mg/min; adjust for desired respiratory response, using inf pump IV; if an inf is

used after initial dose, start at 1-3 mg/min depending on patient response; D/C after 2 hr; wait 1-2 hr and repeat
• Only after adequate airway is established
• After O_2, IV barbiturates, resuscitative equipment available

Syringe compatibilities: Amikacin, butorphanol, chlorproMAZINE, cimetidine, CISplatin, cyclophosphamide, DOPamine, doxycycline, EPINEPHrine, hydrOXYzine, imipramine, isoniazid, lincomycin, methotrexate, netilmicin, phytonadione, pyridoxine, terbutaline, thiamine, tobramycin, vinCRIStine

Perform/provide:
• Placing patient in Sims' position to prevent aspiration of vomitus
• Discontinue infusion if side effects occur; narrow margin of safety

Evaluate:
• Therapeutic response: increased breathing capacity

Teach patient/family:
• Purpose of medication

doxazosin (Rx)

(dox-ay'zoe-sin)

Cardura, Cardura XL

Func. class.: Peripheral α_1-adrenergic receptor blocker

Chem. class.: Quinazoline

Do not confuse:
Cardura/Coumadin/Cardene/Ridaura

ACTION: Dilates peripheral blood vessels, lowers peripheral resistance; reduction in B/P results from peripheral α_1-adrenergic receptors being blocked

USES: Hypertension, urinary outflow obstruction, symptoms of benign prostatic hyperplasia

CONTRAINDICATIONS: Hypersensitivity to quinazolines

Precautions: Pregnancy (C), breastfeeding, children, hepatic disease

DOSAGE AND ROUTES

BPH
• **Adult: PO** 1 mg/day, increase in stepwise manner to 2, 4, 8 mg/day as needed at 1-2 wk intervals, max 8 mg

Hypertension
• **Adult: PO** 1 mg/day increasing up to 16 mg/day if required; usual range 4-16 mg/day
• **Geriatric: PO** 0.5 mg nightly, gradually increase

Available forms: Tabs 1, 2, 4, 8 mg; ext rel tabs 4, 8 mg

Administer:
• Store in tight container at room temperature
• **Tabs** broken, crushed, or chewed; if chewed, will be bitter; do not break, crush, chew XL tabs
• **Immediate release tab:** without regard to meals; **ext rel tabs:** give with breakfast; when switching from immediate release to ext rel, the final evening dose of immediate release should not be taken

SIDE EFFECTS

CNS: *Dizziness*, headache, drowsiness, anxiety, depression, vertigo, weakness, fatigue, asthenia

CV: Palpitations, *orthostatic hypotension*, tachycardia, edema, **dysrhythmias**, chest pain

EENT: Epistaxis, tinnitus, dry mouth, red sclera, pharyngitis, rhinitis

GI: Nausea, vomiting, diarrhea, constipation, abdominal pain

GU: Incontinence, polyuria, priapism

PHARMACOKINETICS

PO: Onset 2 hr, peak 2-6 hr, duration 6-12 hr, half-life 22 hr, metabolized in liver, excreted via bile/feces (<63%) and in urine (9%), extensively protein bound (98%)

INTERACTIONS

Increase: hypotensive effects—alcohol, other antihypertensives, sildenafil, vardenafil, nitrates

Decrease: antihypertensive effects of cloNIDine

NURSING CONSIDERATIONS

Assess:

- **Hypertension:** B/P (lying, standing), pulse 2-6 hr after each dose, with each increase; postural effects may occur, crackles, dyspnea, orthopnea with B/P; pulse; jugular venous distention during beginning treatment
- **BPH:** urinary pattern changes (hesitancy, dribbling, incomplete bladder emptying, dysuria, urgency, nocturia, urgency incontinence, intermittency) before and during treatment
- I&O, weight daily; edema in feet, legs daily

Evaluate:

- Therapeutic response: decreased B/P; decreased symptoms of BPH

Teach patient/family:

- That fainting occasionally occurs after 1st dose; not to drive, operate machinery for 4 hr after 1st dose, after dosage increase; to take 1st dose at bedtime; may take 1-2 wk to respond with BPH

TREATMENT OF OVERDOSE:

Administer volume expanders or vasopressors; discontinue product; place patient in supine position

doxepin (Rx)

(dox'e-pin)

Prudoxin Cream, Silenor, Zonalon Topical Cream

Func. class.: Antidepressant, tricyclic, antihistamine (topical)

Chem. class.: Dibenzoxepin, tertiary amine

ACTION: Blocks reuptake of norepinephrine, serotonin into nerve endings, increasing action of norepinephrine, serotonin in nerve cells

USES: Major depression, anxiety; *topical:* lichen simplex, atopic dermatitis, eczema

Unlabeled uses: Topical pruritus, insomnia, migraine prophylaxis

CONTRAINDICATIONS: Hypersensitivity to tricyclics, urinary retention, closed-angle glaucoma, prostatic hypertrophy, acute recovery from MI

Precautions: Pregnancy (C) (PO) (B) (topical), breastfeeding, geriatric patients, seizures

Black Box Warning: Children, suicidal patients

DOSAGE AND ROUTES

Depression/anxiety

- **Adult: PO** 50-75 mg/day, may increase to 300 mg/day for severely ill; give in divided doses if >150 mg/day
- **Geriatric: PO** 25-50 mg at bedtime, increase weekly by 25-50 mg to desired dose, max 150 mg/day

Pruritus

- **Adult: PO** 10 mg at bedtime, may increase to 25 mg at bedtime; **TOP** apply thin film qid at least 3 hr apart

Insomnia (Silenor)

- **Adult: PO** 6 mg 30 min before bedtime, 3 mg may be sufficient, max 6 mg/night

Available forms: Caps 10, 25, 50, 75, 100, 150 mg; oral conc 10 mg/ml; cream 5%; tabs (Silenor) 3, 6 mg

Administer:

- **Oral conc:** should be diluted with 120 ml water, milk or orange, grapefruit, tomato, prune, or pineapple juice; do not mix with grape juice
- Increased fluids, bulk in diet for constipation
- With food, milk for GI symptoms; do not give with carbonated beverages
- Dosage at bedtime to avoid oversedation during day; may take entire dose at bedtime; geriatric patients may not tolerate daily dosing
- Gum, hard candy, or frequent sips of water for dry mouth

• **Topical:** by applying to affected area, rub slightly; do not use occlusive dressings

SIDE EFFECTS

CNS: *Dizziness, drowsiness,* confusion, headache, anxiety, tremors, stimulation, weakness, insomnia, nightmares, EPS (geriatric patients), increased psychiatric symptoms, paresthesia, suicidal ideation

CV: *Orthostatic hypotension, ECG changes, tachycardia,* hypertension, palpitations, dysrhythmias

EENT: *Blurred vision,* tinnitus, mydriasis, ophthalmoplegia, glossitis

GI: *Diarrhea, dry mouth,* nausea, vomiting, paralytic ileus, increased appetite, cramps, epigastric distress, jaundice, hepatitis, stomatitis, constipation

GU: *Urinary retention,* acute renal failure

HEMA: Agranulocytosis, thrombocytopenia, eosinophilia, leukopenia, pancytopenia, purpuric disorder

INTEG: Rash, urticaria, sweating, pruritus, photosensitivity

PHARMACOKINETICS

PO: Steady state 2-8 days, metabolized by liver, excreted by kidneys, crosses placenta, excreted in breast milk, half-life 8-24 hr

INTERACTIONS

Increase: hyperpyretic crisis, seizures, hypertensive episode—MAOIs

Increase: hypertensive action—EPINEPHrine, norepinephrine

Increase: hypertensive crisis—cloNIDine; do not use together

Increase: doxepin effect—cimetidine, FLUoxetine, fluvoxaMINE, PARoxetine, sertraline

Increase: CNS depression—barbiturates, benzodiazepines, sedative/hypnotics, alcohol, other CNS depressants

Increase: QT interval: class IC/III antiarrhythmics (propafenone, flecainide), quinolones

Serotonin syndrome

Increase: toxicity—SSRIs, SNRIs, serotonin-receptor agonists

Increase: anticholinergic effects—anticholinergics

Drug/Herb

• Serotonin syndrome: St. John's wort

Drug/Lab Test

Increase: serum bilirubin, blood glucose, alk phos, LFTs

NURSING CONSIDERATIONS

Assess:

• B/P (lying, standing), pulse q4hr; if systolic B/P drops 20 mm Hg, hold product, notify prescriber; VS q4hr in patients with CV disease

• Blood studies: CBC, leukocytes, differential, cardiac enzymes if patient is receiving long-term therapy

• Hepatic studies: AST, ALT, bilirubin

• Weight weekly; appetite may increase with product

• **ECG** for flattening of T wave, bundle branch block, AV block, dysrhythmias in cardiac patients; product should be discontinued gradually several days before surgery

• **EPS** primarily in geriatric patients: rigidity, dystonia, akathisia

• **Depression:** mood, sensorium, affect, suicidal tendencies, increase in psychiatric symptoms

• **Chronic pain:** location, severity, type before and during treatment, alleviating/aggravating factors

• Urinary retention, constipation; constipation most likely in children, geriatric patients

• **Withdrawal symptoms:** headache, nausea, vomiting, muscle pain, weakness; not usual unless product is discontinued abruptly

• Alcohol consumption; if alcohol is consumed, hold dose until morning

Perform/provide:

• Storage in tight container protected from direct sunlight

• Assistance with ambulation during beginning therapy because drowsiness/dizziness occurs; safety measures primarily for geriatric patients

• Check to confirm that PO medication is swallowed

Evaluate:
- Therapeutic response: decreased anxiety, depression

Teach patient/family:
- That therapeutic effect (depression) may take 2-3 wk, antianxiety effects sooner
- To use caution when driving, during other activities requiring alertness because of drowsiness, dizziness, blurred vision
- To avoid alcohol, other CNS depressants; may potentiate effects
- Not to discontinue medication abruptly after long-term use; may cause nausea, headache, malaise
- To wear sunscreen or large hat; photosensitivity occurs
- That clinical worsening and suicide may occur
- To immediately report urinary retention

TREATMENT OF OVERDOSE:
ECG monitoring; lavage, activated charcoal; administer anticonvulsant, sodium bicarbonate

DOXOrubicin
(dox-oh-roo'bi-sin)

Adriamycin

Func. class.: Antineoplastic, antibiotic

Chem. class.: Anthracycline glycoside

Do not confuse:
DOXOrubicin /DOXOrubicin liposomal/ DAUNOrubicin

ACTION:
Inhibits DNA synthesis primarily; replication is decreased by binding to DNA, which causes strand splitting; active throughout entire cell cycle; a vesicant

USES:
Wilms' tumor; bladder, breast, lung, ovarian, stomach, thyroid cancer; Hodgkin's/non-Hodgkin's disease; acute lymphoblastic leukemia; myeloblastic leukemia; neuroblastomas; lymphomas; soft tissue/bone sarcomas

CONTRAINDICATIONS:
Pregnancy (D) 1st trimester, breastfeeding, hypersensitivity, systemic infections, cardiac disorders, severe myelosuppression, lifetime dose of 550 mg/m^2

Black Box Warning: Hepatic disease

Precautions: Accidental exposure, cardiac disease, dental work, electrolyte imbalance, infection, hyperuricemia

Black Box Warning: Bone marrow suppression, extravasation, heart failure, secondary malignancy; requires an experienced clinician

DOSAGE AND ROUTES
- **Adult: IV** 60-75 mg/m^2 every 3 wk, or may be used in combination with other antineoplastics with 40-60 mg/m^2 every 21-28 days, max cumulative dose 550 mg/m^2 or 450 mg/m^2 if prior DAUNOrubicin, cyclophosphamide, mediastinal XRT

Hepatic dose

Adult: IV Bilirubin 1.2-3 mg/dl, give 50% of dose; bilirubin 3.1-5 mg/dl, give 25% of dose

Renal dose

Adult: IV CCr < 10 ml/min give 75% of dose

Available forms: Powder for inj 10, 20, 50 mg; inj 2 mg/ml

Administer:

IV route
- Give antiemetic 30-60 min before product to prevent vomiting
- Give allopurinol or sodium bicarbonate to maintain uric acid levels, alkalization of urine
- Use cytotoxic handling procedures: Inspect for particulate and discoloration before use

Black Box Warning: Do not give IM, subcut

Black Box Warning: If extravasation occurs, stop infusion and complete via another vein, preferably in another limb
- Aluminum needles may be used during administration, avoid aluminum during storage

• Rapid injection can cause facial flushing or erythema along the vein

Reconstitution:

• To avoid risks with reconstitution, the commercially available injection may be used; there are still risks involved in handling the injection

• Do not use diluents containing preservatives to reconstitute powder for injection

• Reconstitute 10, 20, 50, 100 mg of DOXOrubicin with 5, 10, 25, 50 ml, respectively, of nonbacteriostatic NS injection (2 mg/ ml), shake until completely dissolved; use reconstituted solution within 24 hr. Do not expose to sunlight

• **IV injection** Inject reconstituted solution over >3–5 min via Y-site or 3-way stopcock into a free-flowing IV infusion of NS or D_5W. A butterfly needle inserted into a large vein is preferred.

Black Box Warning: Care should be taken to avoid extravasation because the drug is extremely irritating to extravascular tissue

Y-site compatibilities: Alemtuzumab, alfentanil, amifostine, amikacin, anidulafungin, argatroban, aztreonam, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, carmustine, caspofungin, ceftizoxime, chlorproMAZINE, cimetidine, ciprofloxacin, CISplatin, cladribine, clindamycin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, dolasetron, DOPamine, doripenem, doxycycline, droperidol, enalaprilat, ePHEDrine, EPINEPHrine, erythromycin, esmolol, etoposide, etoposide phosphate, famotidine, fenoldopam, fentaNYL, filgrastim, fluconazole, fludarabine, gemcitabine, gentamicin, granisetron, haloperidol, hydrocortisone, HYDROmorphone, ifosfamide, imipenem cilastatin, inamrinone, isoproterenol, ketorolac, labetalol, leucovorin, levorphanol, lidocaine, linezolid, LORazepam, mannitol, mechlorethamine, melphalan, meperidine, mesna, methotrexate, metoclopramide, metoprolol, metroNIDAZOLE, midazolam, milrinone, mitoMYcin, morphine, nalbuphine, naloxone, nesiritide, niCARdipine, nitroglycerin, nitroprusside, octreotide, ofloxacin, ondansetron, oxaliplatin, PACLitaxel, palonosetron, pancuronium, phenylephrine, potassium chloride, procainamide, prochlorperazine, promethazine, propranolol, quinupristin-dalfopristin, ranitidine, sargramostim, sodium acetate, tacrolimus, teniposide, theophylline, thiotepa, ticarcillin/clavulanate, tigecycline, tirofiban, tobramycin, topotecan, trastuzumab, trimethobenzamide, vancomycin, vasopressin, vecuronium, verapamil, vinBLASTine, vinCRIStine, vinorelbine, zidovudine, zoledronic acid

SIDE EFFECTS

CV: Increased B/P, sinus tachycardia, PVCs, chest pain, bradycardia, extrasystoles, irreversible cardiomyopathy, acute left ventricular failure

GI: *Nausea, vomiting,* anorexia, *mucositis,* hepatotoxicity

GU: Impotence, sterility, amenorrhea, gynecomastia, hyperuricemia, urine discoloration

HEMA: Thrombocytopenia, leukopenia, anemia

INTEG: *Rash,* necrosis at inj site, dermatitis, reversible *alopecia,* cellulitis, thrombophlebitis at inj site

SYST: Anaphylaxis

PHARMACOKINETICS

Half-life 30 min, terminal 16.5 hr; metabolized by liver; crosses placenta; excreted in urine, bile, breast milk

INTERACTIONS

Increase: life-threatening dysrhythmias—posaconazole, fluconazole, do not use together

Increase: QT prolongation—other drugs that increase QT prolongation

Increase: neutropenia, thrombocytopenia—progesterone

Increase: Cardiomyopathy—calcium-channel blockers

Increase: Toxicity—other antineoplastics, cycloSPORINE, radiation, mercaptopurine
Increase: Hemorrhagic cystitis risk, cardiac toxicity—cyclophosphamide
Increase: Effect of phenytoin, fosphenytoin
Increase: DOXOrubicin effect—streptozocin
Decrease: DOXOrubicin effect—PHENobarbital
Decrease: Antibody response—live virus vaccine
Decrease: Antineoplastic effect—hematopoietic progenitor cell; do not use 24 hr before or after treatment
Decrease: Clearance of DOXOrubicin—PACLitaxel

Drug/Lab Test
Increase: uric acid

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Bone marrow depression: CBC, differential, platelet count weekly; withhold or reduce dose of product if WBC is $<1500/mm^3$ or platelet count is $<50,000/mm^3$; notify prescriber of these results

Renal studies: BUN, serum uric acid, urine CCr, electrolytes before, during therapy
I&O ratio: Report fall in urine output to <30 ml/hr
Monitor temp: Fever might indicate beginning infection

Black Box Warning: Hepatotoxicity: hepatic studies before, during therapy: bilirubin, AST, ALT, alk phos as needed or monthly; check for jaundice of skin and sclera, dark urine, clay-colored stools, itchy skin, abdominal pain, fever, diarrhea

Black Box Warning: Dysrhythmias: ECG; watch for ST-T wave changes, low QRS and T, possible dysrhythmias (sinus tachycardia, heart block, PVCs), ejection fraction before treatment, signs of irreversible cardiomyopathy, can occur up to 6 mo after treatment begins

- Bleeding: hematuria, guaiac, bruising, petechiae of mucosa or orifices every 8 hr
- Effects of alopecia on body image; discuss feelings about body changes; almost total alopecia is expected
- Buccal cavity every 8 hr for dryness, sores, ulceration, white patches, oral pain, bleeding, dysphagia
- Alkalosis if severe vomiting is present

Black Box Warning: Extravasation: local irritation, pain, burning at inj site; a vesicant; if extravasation occurs, stop drug, restart at another site, apply ice, elevate extremity to reduce swelling; if resolution does not occur, surgical debridement may be required

- GI symptoms: frequency of stools, cramping

Perform/provide:

- Increased fluid intake to 2-3 L/day to prevent urate, calculi formation
- Rinsing of mouth tid-qid with water, club soda; brushing of teeth bid-tid with soft brush or cotton-tipped applicators for stomatitis; use unwaxed dental floss
- Storage at room temp for 24 hr after reconstituting

Evaluate:

- Therapeutic response: decreased tumor size, spread of malignancy

Teach patient/family:

- To add 2-3 L of fluids unless contraindicated before and for 24-48 hr after to decrease possible hemorrhagic cystitis
- To report any complaints, side effects to nurse or prescriber
- That hair may be lost during treatment; that wig or hairpiece might make patient feel better; that new hair might be different in color, texture
- To avoid foods with citric acid, hot or rough texture
- To report any bleeding, white spots, ulcerations in mouth to prescriber; to examine mouth daily
- That urine, other body fluids may be red-orange for 48 hr
- To avoid crowds and persons with infections when granulocyte count is low

- That barrier contraceptive measures are recommended during therapy and for 4 mo after (pregnancy [D]); to avoid breastfeeding
- To avoid vaccinations

DOXOrubicin liposomal

(dox-oh-roo'bi-sin)

Doxil, Lipodex

Func. class.: Antineoplastic, antibiotic

Chem. class.: Anthracycline glycoside

Do not confuse: DOXOrubicin/DOXOrubicin liposomal/DAUNOrubicin

ACTION: Inhibits DNA synthesis primarily; replication is decreased by binding to DNA, which causes strand splitting; active throughout entire cell cycle; a vesicant

USES: AIDS-related Kaposi's sarcoma, multiple myeloma, metastatic ovarian carcinoma

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, hypersensitivity, systemic infections, cardiac disorders

Black Box Warning: Cardiotoxicity, infusion reactions, myelosuppression, hepatic disease

Precautions: Children, infection, leukopenia, stomatitis, thrombo-cytopenia

DOSAGE AND ROUTES

Max lifetime cumulative dose 550 mg/m^2; 400 mg/m^2 for those that have received other cardiotoxics or mediastinal radiation

Kaposi's sarcoma

- **Adult: IV** 20 mg/m^2 every 3 wk

Multiple myeloma

- **Adult: IV** 30 mg/m^2 IV infusion on day 4 every 3 wk plus bortezomib 1.3 mg/m^2/dose IV bolus on days 1, 4, 8, 11 of each cycle; give DOXOrubicin liposomal after bortezomib receipt on day 4. Administer up to 8 treatment cycles or until disease progression or unacceptable toxicity occurs

Ovarian cancer that has progressed or recurred after platinum-based chemotherapy

- **Adult: IV** 50 mg/m^2 every 4 wk. Continue treatment for as long as the patient shows benefit and does not progress. A minimum of 4 courses is recommended

Available forms: Liposomal dispersion for inj: 2 mg/ml

Administer:

- Prepared liposomal DOXOrubicin is a translucent, red liposomal dispersion. Visually inspect for particulate matter and discoloration before use
- Pegylated liposomal DOXOrubicin (Doxil) is for IV INF use only and should not be given IM/subcut, give under the supervision of a physician who is experienced in cancer chemotherapy

Black Box Warning: Care should be taken to avoid extravasation because the drug is irritating to extravascular tissue

- Premedication with antiemetics is recommended

IV route

- **Reconstitution (Doxil):** Dilute the appropriate dose, not to exceed 90 mg/250 ml D_5W. Do not mix with any other diluent, drugs, or bacteriostatic agent, use aseptic technique; product contains no preservative or bacteriostatic agent; diluted solution must be refrigerated and used within 24 hr
- **IV INF (Doxil):** Do not administer as a bolus injection or an undiluted solution. Rapid injection can increase the risk of an infusion-related reaction

Black Box Warning: Care should be taken to avoid extravasation because the drug is irritating to extravascular tissue

- An acute infusion reaction can occur during the first infusion and is usually resolved by slowing the rate of infusion. Most patients can tolerate subsequent infusions
- **Rate:** Infuse at an initial rate of 1 mg/min. If no infusion-related action, the rate can be increased to complete the infusion over 1 hr; do not filter
- **For hematologic toxicity in patients**

with ovarian cancer or HIV-related Kaposi's sarcoma: Grade 1 (ANC of 1500-1900/mm^3, platelets ≥75,000/mm^3): No dose reduction. **Grade 2 (ANC of 1000-1499/mm^3, platelets ≥50,000/mm^3 and < 75,000/mm^3:** Wait until ANC ≥1500 cells/mm^3 and platelets ≥75,000 cells/mm^3; redose with no dose reduction. **Grade 3 (ANC of 500-999/mm^3, platelets ≥25,000/mm^3 and <50,000/mm^3):** Wait until ANC ≥1500 cells/mm^3 and platelets ≥75,000 cells/mm^3; redose with no dose reduction. **Grade 4 (ANC <500/mm^3, platelets <25,000/mm^3):** Wait until ANC ≥1500 cells/mm^3 and platelets ≥75,000 cells/mm^3; reduce dose by 25% or continue with full dose with colony-stimulating factor

- Give antiemetic 30-60 min before product to prevent vomiting
- Use allopurinol or sodium bicarbonate to maintain uric acid levels, alkalinization of urine
- Avoid mixing with other products

SIDE EFFECTS

CNS: Paresthesias, headache, depression, insomnia, fatigue, fever

CV: Chest pain, decreased B/P, cardiomyopathy, heart failure, dysrhythmias, tachycardia

EENT: Optic neuritis, rhinitis, pharyngitis, stomatitis

GI: *Nausea, vomiting,* anorexia, *mucositis,* hepatotoxicity, constipation, oral candidiasis, abdominal pain

HEMA: Thrombocytopenia, leukopenia, anemia, neutropenia

INTEG: *Rash,* necrosis at inj site, dermatitis, reversible *alopecia,* exfoliative dermatitis, palmar-plantar erythrodysesthesia, thrombophlebitis at inj site

RESP: Dyspnea, cough, respiratory infections

PHARMACOKINETICS

Half-life 55 hr; metabolized by liver; crosses placenta; excreted in urine, bile, breast milk

INTERACTIONS

Increase: life-threatening dysrhythmias—posaconazole, fluconazole, do not use together

Increase: QT prolongation—other drugs that increase QT prolongation

Increase: neutropenia, thrombocytopenia—progesterone

Increase: cardiomyopathy—calcium-channel blockers

Increase: toxicity—other antineoplastics, cycloSPORINE, radiation, mercaptopurine

Increase: hemorrhagic cystitis risk, cardiac toxicity—cyclophosphamide

Increase: effect of—phenytoin, fosphenytoin

Increase: DOXOrubicin effect—streptozocin

Decrease: DOXOrubicin effect—PHENobarbital

Decrease: antibody response—live virus vaccine

Decrease: antineoplastic effect—hematopoietic progenitor cell; do not use 24 hr before or after treatment

Decrease: clearance of DOXOrubicin—PACLitaxel

Drug/Lab Test

Increase: uric acid

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Bone marrow depression: CBC, differential, platelet count weekly; withhold product if WBC is <4000/mm^3 or platelet count is <75,000/mm^3; notify prescriber of these results

- Renal studies: BUN, serum uric acid, urine CCr, electrolytes before, during therapy
- I&O ratio: report fall in urine output to <30 ml/hr
- Monitor temp; fever can indicate beginning infection

Black Box Warning: Hepatotoxicity: Hepatic studies before, during therapy: bilirubin, AST, ALT, alk phos as needed or monthly; check for jaundice of skin and sclera, dark urine, clay-colored stools, itchy skin, abdominal pain, fever, diarrhea

Black Box Warning: Dysrhythmias: ECG: watch for ST-T wave changes, low QRS and T, possible dysrhythmias (sinus tachycardia, heart block, PVCs), ejection fraction before treatment, signs of irreversible cardiomyopathy, can occur up to 6 mo after treatment begins

- Bleeding: hematuria, guaiac, bruising, petechiae of mucosa or orifices every 8 hr
- Effects of alopecia on body image; discuss feelings about body changes; almost total alopecia is expected
- Inflammation of mucosa, breaks in skin
- Buccal cavity every 8 hr for dryness, sores, ulceration, white patches, oral pain, bleeding, dysphagia
- Alkalosis if severe vomiting is present

Black Box Warning: Extravasation: Local irritation, pain, burning at inj site; a vesicant; if extravasation occurs, stop drug, restart at another site, apply ice, elevate extremity to reduce swelling; if resolution does not occur, surgical debridement may be required

- GI symptoms: frequency of stools, cramping

Perform/provide:

- Liquid diet: carbonated beverages, gelatin may be added if patient is not nauseated or vomiting
- Increased fluid intake to 2-3 L/day to prevent urate, calculi formation
- Rinsing of mouth tid-qid with water, club soda; brushing of teeth bid-tid with soft brush or cotton-tipped applicators for stomatitis; use unwaxed dental floss
- Store refrigerated for 24 hr after reconstituting

Evaluate:

- Therapeutic response: decreased tumor size, spread of malignancy

Teach patient/family:

- To add 2-3 L of fluids unless contraindicated before and for 24-48 hr after to decrease possible **hemorrhagic cystitis**
- To report any complaints, side effects to nurse or prescriber
- That hair may be lost during treatment; that wig or hairpiece might make patient feel better; that new hair may be different in color, texture
- To avoid foods with citric acid, hot or rough texture
- To report any bleeding, white spots, ulcerations in mouth to prescriber; to examine mouth daily
- That urine, other body fluids may be red-orange for 48 hr
- To avoid crowds and persons with infections when granulocyte count is low
- That barrier contraceptive measures are recommended during therapy and for 4 mo after (pregnancy [D]); to avoid breastfeeding
- To avoid vaccinations because reactions can occur; to avoid alcohol

D

doxycycline (Rx)

(dox-i-sye'kleen)

Oracea

doxycycline calcium

Vibramycin

doxycycline hyclate

Adoxa, Apo-Doxy ♣, Doryx, Doxy, Doxycaps, Doxycin ♣, Periostat, Vibramycin, Vibra-Tabs

doxycycline monohydrate

Adoxa, Monodox, Vibramycin

Func. class.: Antiinfective

Chem. class.: Tetracycline

Do not confuse:

doxycycline/doxepin/dicyclomine

ACTION: Inhibits protein synthesis, phosphorylation in microorganisms by binding to 30S ribosomal subunits, re-

versibly binding to 50S ribosomal subunits; bacteriostatic

USES: Syphilis, *Chlamydia trachomatis*, gonorrhea, *Rickettsia*, lymphogranuloma venereum, uncommon gram-negative/gram-positive organisms, malaria prophylaxis, chronic periodontitis, acne, anthrax, Lyme disease

Unlabeled uses: Traveler's diarrhea, prevention of chronic bronchitis, leptospirosis, pleural effusion, malaria (chloroquine-resistant *Plasmodium falciparum*)

CONTRAINDICATIONS: Pregnancy (D), children <8 yr, hypersensitivity to tetracyclines, esophageal ulceration

Precautions: Breastfeeding, hepatic disease, pseudomembranous colitis, ulcerative colitis

DOSAGE AND ROUTES

Most infections

- **Adult: PO/IV** 100 mg q12hr on day 1 then 100 mg/day; **IV** 200 mg in 1-2 inf on day 1 then 100-200 mg/day
- **Child >8 yr, ≥45 kg: PO** 100 mg q12hr on day 1 then 100 mg daily; severe infections 100 mg q12hr; **IV** 200 mg on day 1 then 100-200 mg daily, give 200 mg dose as 1 or 2 inf
- **Child ≥8 yr, <45 kg: PO** 2.2 mg/kg q12hr on day 1 then 2.2 mg/kg daily, severe infections 2.2 mg/kg q12hr; **IV** 4.4 mg/kg on day 1 then 2.2-4.4 mg/kg daily in 1 to 2 divided doses

Gonorrhea (uncomplicated) in patients allergic to penicillin

- **Adult: PO** 100 mg q12hr × 7 days or 300 mg followed 1 hr later by another 300 mg

Malaria prophylaxis

- **Adult: PO** 100 mg/day 1-2 days before travel, daily during travel, and for 4 wk after return
- **Adolescent/child ≥8 yr, <45 kg: PO** 2 mg/kg/day (up to 100 mg/day) begin 1-2 days before travel, continue for 4 wk after return

C. trachomatis

- **Adult: PO** 100 mg bid × 7 days

Syphilis

- **Adult: PO** 100 mg bid × 14 days

Anthrax

- **Adult and child >8 yr and ≥45 kg: IV** 100 mg q12hr; change to **PO** when able × 60 days
- **Adolescent/child ≥8 yr and <45 kg: PO** 2.2 mg/kg q12hr × 60 days; **IV** 100 mg q12hr, change to **PO** when able × 60 days

Lyme disease

- **Adult/adolescent/child ≥8 yr: PO** 100 mg bid × 10-21 days

Periodontitis

- **Adult:** 20 mg bid after scaling and root planing for ≤9 mo; give close to meal time AM or PM

Pleural effusion (unlabeled)

- **Adult: INTRACAVITARY** 500 mg diluted with 250 ml 0.9% NaCl given by chest tube lavage and drainage

Available forms: Doxycycline: cap 40 mg; doxycycline calcium: syrup 50 mg/5 ml; doxycycline hyclate: cap 50, 100 mg; pellet caps 75, 100 mg; inj 42.5, 100, 200 mg; tabs 20, 100 mg; doxycycline monohydrate: caps 50, 100 mg; tabs 50, 75, 100 mg; oral susp 25 mg/5 ml

Administer:

PO route

- Do not break, crush, or chew caps; may crush tabs and mix with food
- On empty stomach or with full glass of water 2 hr before or after meals; avoid dairy products, antacids, laxatives, iron-containing products; if these must be taken, give 2 hr before or after product; avoid giving oral products within 1 hr of bedtime, esophageal ulceration may occur

Intermittent IV INF route

- After diluting 100 mg or less/10 ml of sterile water or NS for inj, further dilute with 100-1000 ml of NaCl, D_5, Ringer's, LR D_5LR, Normosol-M, Normosol-R in D_5W; run 100 mg or less over 1-4 hr; inf must be completed in 6 hr when diluted in LR sol or 12 hr with other sol; protect from light, heat

Y-site compatibilities: Acyclovir, alemtuzumab, alfentanil, amifostine, amikacin,

aminophylline, amiodarone, anidulafungin, ascorbic acid, atracurium, atropine, aztreonam, bivalirudin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, caspofungin, cefonicid, cefotaxime, cefTRIAXone, chlorproMAZINE, cimetidine, cisatracurium, CISplatin, clindamycin, codeine, cyanocobalamin, cyclophosphamide, cyclosPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexmedetomidine, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, doxacurium, DOXOrubicin, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, epoetin alfa, eptifibatide, ertapenem, esmolol, etoposide, etoposide phosphate, famotidine, fenoldopam, fentaNYL, filgrastim, fluconazole, fludarabine, gemcitabine, gemtuzumab, gentamicin, glycopyrrolate, granisetron, HYDROmorphone, IDArubicin, ifosfamide, imipenem/cilastatin, insulin, isoproterenol, labetalol, levofloxacin, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, melphalan, meperidine, metaraminol, methoxamine, methyldopate, metoclopramide, metoprolol, metroNIDAZOLE, miconazole, midazolam, milrinone, mitoXANtrone, morphine, multivitamins, nalbuphine, naloxone, nesiritide, netilmicin, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxaliplatin, oxytocin, PACLitaxel, pancuronium, pantoprazole, papaverine, pentamidine, pentazocine, perphenazine, phentolamine, phenylephrine, phytonadione, potassium chloride, procainamide, prochlorperazine, promethazine, propofol, propranolol, protamine, pyridoxime, quinupristin/dalfopristin, ranitidine, remifentanil, ritodrine, riTUXimab, rocuronium, sargramostim, sodium acetate, succinylcholine, SUFentanil, tacrolimus, telavancin, teniposide, theophylline, thiamine, thiotepa, tirofiban, tobramycin, tolazoline, TPN (2 in 1), trastuzumab, trimetaphan, urokinase, vancomycin, vasopressin, vecuronium, verapamil, vinCRIStine, vinorelbine, voriconazole, zoledronic acid

SIDE EFFECTS

CNS: Fever

CV: Pericarditis

EENT: Dysphagia, glossitis, decreased calcification of deciduous teeth, oral candidiasis, tooth discoloration

GI: *Nausea, abdominal pain, vomiting, diarrhea,* anorexia, enterocolitis, hepatotoxicity, flatulence, abdominal cramps, gastric burning, stomatitis

GU: *Increased BUN*

HEMA: Eosinophilia, neutropenia, thrombocytopenia, hemolytic anemia

INTEG: *Rash, urticaria, photosensitivity, increased pigmentation,* exfoliative dermatitis, pruritus

MS: Bone growth retardation (<8 yr old)

SYST: Stevens-Johnson syndrome, angioedema, anaphylaxis

PHARMACOKINETICS

PO: Well absorbed; widely distributed; peak 1 1/2–4 hr; half-life 14-17 hr; excreted in urine, feces, bile; 90% protein bound; crosses placenta; enters breast milk

INTERACTIONS

Increase: effect of—anticoagulants, digoxin

Decrease: doxycycline effect—antacids, $NaHCO_3$, dairy products, alkali products, iron, kaolin/pectin, barbiturates, carBAMazepine, phenytoin, cimetidine sucralfate, cholestyramine, colestipol, rifampin, bismuth; iron, magnesium, zinc, calcium, aluminum salts

Decrease: effects—penicillins, oral contraceptives, digoxin

Drug/Lab Test

Increase: BUN, alk phos, bilirubin, amylase, ALT, AST, eosinophils, WBC

Decrease: Hgb

False increase: urinary catecholamines

NURSING CONSIDERATIONS

Assess:

- I&O ratio
- Blood studies: PT, CBC, AST, ALT, BUN, creatinine
- Signs of infection

- **Allergic reactions:** rash, itching, pruritus, angioedema
- Nausea, vomiting, diarrhea; administer antiemetic, antacids as ordered
- **Overgrowth of infection:** fever, malaise, redness, pain, swelling, drainage, perineal itching, diarrhea, changes in cough or sputum
- IV site for phlebitis/thrombosis; product is highly irritating
- After C&S is obtained, do not wait for results

Perform/provide:

- Storage in tight, light-resistant container at room temp; IV stable for 12 hr at room temp, 72 hr refrigerated; discard if precipitate forms

Evaluate:

- Therapeutic response: decreased temp, absence of lesions, negative C&S

Teach patient/family:

- To avoid sun because burns may occur; that sunscreen does not seem to decrease photosensitivity
- That all prescribed medication must be taken to prevent superinfection; not to use outdated products because Fanconi syndrome may occur (reversible nephrotoxicity)
- That if children ≤8 yr old are undergoing tooth development, teeth will be permanently discolored

⚠ HIGH ALERT

dronedarone (Rx)

(drone'da'rone)

Multaq

Func. class.: Antidysrhythmic (class III)

Chem. class.: Iodinated benzofuran derivative

ACTION: Prolongs duration of action potential and effective refractory period, noncompetitive α- and β-adrenergic inhibition; increases RR and QT intervals, decreases sinus rate, decreases peripheral vascular resistance

USES: Atrial fibrillation, atrial flutter

CONTRAINDICATIONS: Pregnancy (X), breastfeeding; 2nd-, 3rd-degree AV block; bradycardia, severe sinus node dysfunction, hypersensitivity, heart failure, hepatic disease, QT prolongation, aminodarone-induced lung toxicity

Black Box Warning: NYHA Class IV heart failure or Class II-III with recent decompensation requiring hospitalization, permanent atrial fibrillation (cannot restore sinus rhythm)

Precautions: Children, geriatric patients, Asian patients, females, electrolyte imbalances, atrial fibrillation/flutter

DOSAGE AND ROUTES

- **Adult: PO** 400 mg bid; discontinue class I, III antidysrhythmics or strong CYP3A4 inhibitors before beginning treatment; max 800 mg/day

Available forms: Tabs 400 mg

Administer:

PO route

- Give bid with morning, evening meals
- Give MedGuide; should be dispensed with each prescription, refill

SIDE EFFECTS

CV: *Bradycardia,* heart failure, QT prolongation, torsades de pointes

ENDO: Hypo/hyperthyroidism

GI: Nausea, vomiting, diarrhea, abdominal pain, severe hepatic injury, hepatic failure

INTEG: Rash, photosensitivity, anaphylaxis

PHARMACOKINETICS

Peak 3-6 hr, half-life 13-19 hr, metabolized by liver, excreted in feces (84%), via kidneys (6%), protein binding >98%

INTERACTIONS

Increase: dronedarone levels: CYP3A inhibitors/2D6 inhibitors

Decrease: dronedarone levels: 3A/2D6 inducers

Increase: 3A/2D6 substrate levels

Increase: bradycardia—β-blockers, calcium channel blockers
Increase: levels of cycloSPORINE, dextromethorphan, digoxin, disopyramide, flecainide, methotrexate, phenytoin, procainamide, quiNIDine, theophylline
Increase: anticoagulant effects—dabigatran, warfarin
Drug/Herb
Increase: anticoagulant effect—yohimbine
Decrease: dronedarone effect—St. John's wort
Drug/Food:
Increase: dronedarone effect, grapefruit; avoid use
Drug/Lab Test
Increase: T_4, creatinine

NURSING CONSIDERATIONS

Assess:

Black Box Warning: NYHA Class IV heart failure or symptomatic heart failure with recent decomposition requiring hospitalization doubles risk of death

- **ECG** to determine product effectiveness; measure PR, QRS, QT intervals; check for PVCs, other dysrhythmias, B/P continuously for hypo/hypertension; report dysrhythmias, slowing heart rate
- Serum creatinine, potassium, magnesium
- I&O ratio; electrolytes (potassium, creatinine, magnesium)
- Dehydration or hypovolemia
- Rebound hypertension after 1-2 hr
- **Hypothyroidism:** lethargy, dizziness, constipation, enlarged thyroid gland, edema of extremities; cool, pale skin
- **Hyperthyroidism:** restlessness, tachycardia, eyelid puffiness, weight loss, frequent urination, menstrual irregularities, dyspnea; warm, moist skin
- Cardiac rate, respiration: rate, rhythm, character, chest pain; start with patient hospitalized and monitored up to 1 wk

Evaluate:

- Therapeutic response: atrial fibrillation, flutter

Teach patient/family:

- To take this product as directed; to avoid missed doses; not to use with grapefruit juice, to avoid all other products without approval of provider
- To immediately report weight gain, edema, difficulty breathing
- To use effective contraception during treatment (pregnancy X) not to breastfeed

TREATMENT OF OVERDOSE:

O_2, artificial ventilation, ECG, administer DOPamine for circulatory depression; administer diazepam or thiopental for seizures, isoproterenol

⚠ HIGH ALERT

droperidol (Rx)

(droe-per'i-dole)
Func. class.: Sedative/hypnotic
Chem. class.: Butyrophenone

ACTION:

Acts on CNS at subcortical levels, produces tranquilization, sleep; antiemetic; mild α-blockade

USES:

Premedication for surgery; induction, maintenance in general anesthesia; postoperatively for nausea, vomiting
Unlabeled uses: Anxiety, general anesthesia induction/maintenance, preanesthesia, sedation induction

CONTRAINDICATIONS:

Breastfeeding, children <2 yr, hypersensitivity

Black Box Warning: QT prolongation, torsades de pointes

Precautions: Pregnancy (C), geriatric patients, CV disease (hypotension, bradydysrhythmias), renal/hepatic disease, Parkinson's disease, pheochromocytoma, CHF, hypokalemia, hypomagnesemia, cardiac hypertrophy

DOSAGE AND ROUTES

Induction, adjunct

- **Adult: IV/IM** 1.25-2.5 mg, may give additional 1.25 mg with caution

• **Child 2-12 yr: IV** 0.05-0.1 mg/kg, titrate to response

Premedication

• **Adult: IM** 2.5 mg ½-1 hr before surgery, may give 1.25-2.5 mg additionally

• **Child 2-12 yr: IM** 0.05-0.1 mg/kg

Available forms: Inj 2.5 mg/ml

Administer:

• Protect sol from light

• Anticholinergics (benztropine, diphenhydrAMINE) for EPS

• Only with crash cart, resuscitative equipment nearby

• IM deep in large muscle mass

Direct IV route

• Undiluted; give through Y-tube at 10 mg or less/min; titrate to patient response

Intermittent IV INF route

• May be given as inf by adding dose to 250 ml LR, D$_5$W, 0.9% NaCl; give slowly, titrate to patient response

Syringe compatibilities: Atropine, bleomycin, butorphanol, chlorproMAZINE, cimetidine, CISplatin, cyclophosphamide, dimenhyDRINATE, diphenhydrAMINE, DOXOrubicin, fentaNYL, glycopyrrolate, hydrOXYzine, meperidine, metoclopramide, midazolam, mitoMYcin, morphine, nalbuphine, pentazocine, perphenazine, prochlorperazine, promazine, promethazine, scopolamine, vinBLAStine, vinCRIStine

Y-site compatibilities: Amifostine, aztreonam, bleomycin, cisatracurium, CISplatin, cladribine, cyclophosphamide, cytarabine, DOXOrubicin, DOXOrubicin liposome, famotidine, filgrastim, fluconazole, fludarabine, granisetron, hydrocortisone, IDArubicin, melphalan, meperidine, metoclopramide, mitoMYcin, ondansetron, PACLitaxel, potassium chloride, propofol, remifentanil, sargramostim, teniposide, thiotepa, vinBLAStine, vinCRIStine, vinorelbine, vit B/C

SIDE EFFECTS

CNS: EPS (dystonia, akathisia, flexion of arms, fine tremors); dizziness, anxiety, drowsiness, restlessness, hallucination, depression, seizures, neuroleptic malignant syndrome

CV: *Tachycardia, hypotension,* prolonged QT, torsades de pointes

EENT: Upward rotation of eyes, oculogyric crisis

INTEG: *Chills, facial sweating, shivering*

RESP: Laryngospasm, bronchospasm

PHARMACOKINETICS

IM/IV: Onset 3-10 min, peak ½ hr, duration 3-6 hr, metabolized in liver, excreted in urine as metabolites, crosses placenta, half-life 2-3 hr

INTERACTIONS

Increase: CNS depression—alcohol, opiates, barbiturates, antihistamines, antipsychotics, or other CNS depressants

Increase: hypotension—nitrates, antihypertensives

Increase: side effects of lithium

Black Box Warning: Increase: QT prolongation—class IA/III antiarrhythmics, some phenothiazines, tricyclics, some quinolones, others

Drug/Herb

Increase: action—kava, valerian, hops, chamomile

NURSING CONSIDERATIONS

Assess:

• VS q10min during IV administration, q30min after IM dose

• EPS: dystonia, akathisia

Nurse Alert For increasing heart rate or decreasing B/P, notify prescriber at once; do not place patient in Trendelenburg position because sympathetic blockade may occur, thereby causing respiratory arrest

Black Box Warning: QT prolongation, torsades de pointes: ECG before and 2-3 hr after administration for serious arrhythmias

Evaluate:

• Therapeutic response: decreased anxiety, absence of vomiting during and after surgery

Teach patient/family:
- To rise slowly from sitting or standing to minimize orthostatic hypotension
- To avoid ambulation without assistance; drowsiness, dizziness may occur

DULoxetine (Rx)

(*doo-lox'uh-teen*)

Cymbalta

Func. class.: Antidepressant

Chem. class.: Serotonin-norepinephrine reuptake inhibitor (SNRI)

ACTION: May potentiate serotonergic, noradrenergic activity in the CNS; in studies, DULoxetine is a potent inhibitor of neuronal serotonin and norepinephrine reuptake

USES: Major depressive disorder (MDD), neuropathic pain associated with diabetic neuropathy, generalized anxiety disorder, fibromyalgia, chronic low back pain, osteoarthritis pain
Unlabeled uses: Stress, urinary incontinence

CONTRAINDICATIONS: Alcohol intoxication, alcoholism, closed-angle glaucoma, hepatic disease, hepatitis, jaundice, hypersensitivity
Precautions: Pregnancy (C), breastfeeding, geriatric patients, mania, hypertension, renal/cardiac disease, seizures, increased intraocular pressure, anorexia nervosa, bleeding, dehydration, diabetes, hyponatremia, hypotension, hypovolemia, orthostatic hypotension, abrupt product withdrawal

Black Box Warning: Children, suicidal ideation

DOSAGE AND ROUTES

Depression
- **Adult: PO** 40-60 mg/day as single dose or 2 divided doses

Diabetic neuropathy
- **Adult: PO** 60 mg/day

Generalized anxiety disorder
- **Adult: PO** 60 mg/day, may start with 30 mg/day × 1 wk then increase to 60 mg/day; maintenance 60-120 mg/day

Fibromyalgia
- **Adult: PO** 30 mg/day × 1 wk then 60 mg/day

Musculoskeletal pain
- **Adult: PO** 60 mg/day or 30 mg/day × 1 wk then 60 mg/day

Renal dose
- **Adult: PO** Start with 20 mg, gradually increase; avoid use in severe renal disease

Available forms: Caps 20, 30, 60 mg

Administer:
- Swallow cap whole; do not break, crush, or chew; do not sprinkle on food or mix with liquid
- Without regard to food

SIDE EFFECTS

CNS: Insomnia, anxiety, dizziness, tremor, somnolence, fatigue, decreased appetite, decreased weight, agitation, diaphoresis, hallucinations, neuroleptic malignant–like syndrome reaction, aggression, seizures, *headache*
CV: Thrombophlebitis, peripheral edema, hypertension, palpitations, supraventricular dysrhythmia
EENT: *Abnormal vision*
ENDO: Hypo/hyperglycemia
GI: Constipation, diarrhea, dysphagia, *nausea*, vomiting, anorexia, dry mouth, colitis, gastritis, abdominal pain, hepatic failure
GU: Abnormal ejaculation, urinary hesitation/retention/frequency, ejaculation delayed, erectile dysfunction, gynecologic bleeding
INTEG: Photosensitivity, bruising, sweating, Stevens-Johnson syndrome
MS: Gait disturbance, muscle spasm, restless leg syndrome
SYST: Anaphylaxis, angioedema, serotonin syndrome, Stevens-Johnson syndrome

PHARMACOKINETICS

Well absorbed; extensively metabolized (CYP2D6, CYP1A2) in the liver to an ac-

tive metabolite; 70% of product recovered in urine, 20% in feces; 90% protein binding; elimination half-life 9.2-19.1 hr

INTERACTIONS

- Do not use with linezolid or methylene blue IV
- Narrow therapeutic index: CYP2D6 extensively metabolized products (flecainide, phenothiazines, propafenone, tricyclics, thioridazine)

⚠ Hyperthermia, rigidity, rapid fluctuations of vital signs, mental status changes, neuroleptic malignant syndrome—MAOIs, coadministration contraindicated within 14 days of MAOI use

Increase: CNS depression—opioids, antihistamines, sedative/hypnotics

Increase: serotonin syndrome, neuroleptic malignant syndrome—SSRIs, serotonin-receptor agonists

Increase: bleeding risk—anticoagulants, antiplatelets, salicylates, NSAIDs

Increase: action of DULoxetine—CYP1A2 inhibitors (fluvoxamine, quinolone antiinfectives); CYP2D6 inhibitors (FLUoxetine, quiNIDine, PARoxetine)

Increase: ALT, bilirubin—alcohol

Drug/Herb

- Serotonin syndrome: St. John's wort

Increase: CNS depression—kava, valerian

Drug/Lab Test

Increase: blood glucose

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Depression: mood, sensorium, affect, **suicidal tendencies,** increase in psychiatric symptoms; depression, panic, monitor children q wk face to face during first 4 wk, or dosage change, then every other week for next 4 wk, then at 12 wk

- B/P lying, standing; pulse q4hr; if systolic B/P drops 20 mm Hg, hold product, notify prescriber; take VS q4hr in patients with CV disease
- Hepatic studies: AST, ALT, bilirubin
- Weight weekly; weight loss or gain; appetite may increase; peripheral edema may occur
- Sugarless gum, hard candy, frequent sips of water for dry mouth
- **Withdrawal symptoms:** headache, nausea, vomiting, muscle pain, weakness; not common unless product is discontinued abruptly

⚠ **Malignant neuroleptic-like syndrome reaction**

⚠ **Serotonin syndrome:** nausea/vomiting, dizziness, facial flush, shivering, sweating

- **Sexual dysfunction:** ejaculation dysfunction, erectile dysfunction, decreased libido, orgasm dysfunction

Perform/provide:

- Storage in tight container at room temp; do not freeze
- Assistance with ambulation during beginning therapy; drowsiness, dizziness occur
- Confirmation that PO medication swallowed

Evaluate:

- Therapeutic response: decreased depression

Teach patient/family:

- To report urinary retention; about signs and symptoms of bleeding (GI bleeding, nosebleed, ecchymoses, bruising)
- To use with caution when driving, performing other activities requiring alertness because of drowsiness, dizziness, blurred vision
- To avoid alcohol ingestion, MAOIs, other CNS depressants
- Not to discontinue medication quickly after long-term use; may cause nausea, headache, malaise; taper

Black Box Warning: That clinical worsening and suicide risk may occur

- To wear sunscreen or large hat; photosensitivity may occur
- To notify prescriber if pregnancy planned or suspected, or if breastfeeding
- Improvement may occur in 4-8 wk or in up to 12 wk (geriatric patients)

dutasteride (Rx)

(doo-tass'ter-ide)

Avodart

Func. class.: Androgen inhibitor

Chem. class.: Synthetic 5α-reductase inhibitor, 4-azasteroid compound

ACTION: Inhibits both type 1 and type 2 forms of a steroid enzyme that converts testosterone to 5α-dihydrotestosterone (DHT), which is responsible for the initial growth of prostatic tissue

USES: Treatment of benign prostatic hyperplasia (BPH) in men with an enlarged prostate gland; may be used in combination with tamsulosin

Unlabeled uses: Alopecia

CONTRAINDICATIONS: Pregnancy (X), breastfeeding, women, children, hypersensitivity

Precautions: Hepatic disease

DOSAGE AND ROUTES

Benign prostatic hyperplasia (BPH)

• **Adult: PO** 0.5 mg/day

Alopecia (unlabeled)

• **Adult: PO** 0.5-2.5 mg/day

Available form: Caps 0.5 mg

Administer:

• Swallow caps whole; do not break, crush, chew

• Without regard to meals

SIDE EFFECTS

GU: Decreased libido, impotence, gynecomastia, ejaculation disorders (rare), mastalgia, teratogenesis

INTEG: Serious skin infections

PHARMACOKINETICS

Peak 2-3 hr, protein binding 99%, metabolized in liver by CYP3A4, excreted in feces, half-life 5 wk at steady state

INTERACTIONS

Increase: dutasteride concentrations—ritonavir, ketoconazole, verapamil, diltiazem, cimetidine, ciprofloxacin, antiretroviral protease inhibitors, or other products metabolized by CYP3A4

Drug/Lab Test

Decrease: PSA

D

NURSING CONSIDERATIONS

Assess:

• **For decreasing symptoms of BPH:** decreasing urinary retention, frequency, urgency, nocturia

• PSA levels; digital rectal, urinary obstruction; determine the absence of urinary cancer before starting treatment

• Blood studies: ALT, AST, bilirubin, CBC with differential, serum creatinine, serum electrolytes

Evaluate:

• Therapeutic response: decreasing symptoms of BPH; decreased urinary retention, frequency, urgency, nocturia

Teach patient/family:

• To read patient information leaflet before starting therapy; to reread it upon prescription renewal

• To notify prescriber if therapeutic response decreases, if edema occurs

• Not to discontinue product abruptly

• About changes in sex characteristics

• That men taking dutasteride should not donate blood for at least 6 mo after last dose to prevent blood administration to pregnant female

• That caps should not be handled by a woman who is pregnant or who may become pregnant because product can be absorbed through skin

• That ejaculate volume may decrease during treatment; that product rarely interferes with sexual function

• Should not be used or handled by breastfeeding women

• Swallow whole. Do not crush, chew or open

• May increase risk for developing high-grade prostate cancer

ecallantide

(ee-kal'an-tide)

Kalbitor

Func. class.: Hematological agents

Chem. class.: Kallikrein inhibitor

ACTION: Selectively, reversibly inhibits kallikrein within the inflammatory pathways, preventing excess production of bradykinin

USES: Acute attacks of hereditary angioedema (≥16 yr)

CONTRAINDICATIONS: Hypersensitivity to the drug or its components

Black Box Warning: Anaphylaxis has occurred after administrations (usually within first hour after dosing). Drug should be administered only by health care provider with medical support available to treat anaphylaxis and hereditary angioedema. Monitor patient closely

Precautions: Pregnancy (C), breastfeeding, geriatric patients

DOSAGE AND ROUTES

• **Adult/adolescent ≥16 yr: SUBCUT** 30 mg given as three 10-mg injections; give additional 30-mg dose within 24 hours if attack persists

Available forms: Solution 10 mg/ml

Administer:

• Using aseptic technique, withdraw 1 ml (10 mg) using a large bore needle; change the needle on the syringe to a needle suitable for subcut inj (27 gauge recommended)

• Inject into the skin of the abdomen, thigh, or upper arm

• Repeat the procedure for each of the three vials (30 mg total dose); the injection site for each of the three injections may be in the same or different anatomic location (abdomen, thigh, or upper arm); there is no need for site rotation; individual injections should be separated by at least 2 inches and away from the anatomical site of attack

• The same directions for administration apply if an additional dose is required within 24 hr; different injection sites or the same anatomical location as used for the first dose may be used

• Visually inspect parenteral products for particulate matter and discoloration prior to administration

SIDE EFFECTS

CNS: Fatigue, fever, headache

EENT: Nasopharyngitis

GI: Abdominal pain, diarrhea, nausea, vomiting

INTEG: Injection-site reactions, pruritus, rash, urticaria

RESP: Upper respiratory tract infection

Black Box Warning: Assess: anaphylaxis; usually within first hr after dosing

NURSING CONSIDERATIONS

Teach patient/family:

• To immediately report wheezing, cough, chest tightness, trouble breathing, dizziness, fainting, throat tightness, itchiness, hives, and swelling of tongue or throat.

• Inform patient that drug must be given by health care provider in a health care setting in case serious allergic reaction occurs

econazole

(ee-koe'na-zole)

Func. class.: Topical antifungal

Chem. class.: Imidazole derivative

ACTION: Antifungal activity results from inhibiting cell wall permeability

USES: Tinea corporis, cruris, pedis, versicolor; cutaneous candidiasis

CONTRAINDICATIONS: Hypersensitivity

DOSAGE AND ROUTES

Tinea corporis, cruris, pedis, versicolor

- **Adult/child: TOP** Rub into affected areas daily × 2 wk, or × 4 wk (pedis)

Cutaneous candidiasis

- **Adult/child:** Rub into affected areas bid

Available forms: Topical cream 1%

Administer:

Topical route

- Do not use products near the eyes, nose, or mouth
- Wash hands before and after use. Wash affected area and gently pat dry
- **Cream:** Apply to the cleansed affected area. Massage gently into affected areas

SIDE EFFECTS

INTEG: Burning, rash, pruritus

PHARMACOKINETICS

Unknown

NURSING CONSIDERATIONS

Assess:

- **Allergic reaction**: Assess for hypersensitivity, product might need to be discontinued
- **Infection**: Assess for itching, peeling

Evaluate:

- Decreased itching, peeling

Teach patient/family:

Topical route

- That product is for external use only; do not use skin products near the eyes, nose, or mouth
- To wash hands before and after use; to wash affected area and gently pat dry
- **Cream:** To apply a thin film to the cleansed affected area; massage gently into affected areas

econazole topical

See Appendix B

ecothiophate ophthalmic

See Appendix B

RARELY USED

E

edetate calcium disodium (Rx)

(ee'de-tate)

Calcium Disodium Versenate

Func. class.: Heavy metal antagonist (antidote)

Do not confuse:

edetate calcium disodium/edetate disodium

USES: Lead poisoning, acute lead encephalopathy

CONTRAINDICATIONS: Hypersensitivity, anuria, poisoning of other metals, severe renal disease, hepatitis

Black Box Warning: Child <3 yr

DOSAGE AND ROUTES

Lead mobilization test (lead toxicity 25-45 mcg/dl)

- **Adult/adolescent: IV INF** 500 mg/m^2 over 1 hr or **IM**
- **Child: IV INF** 500 mg/m^2 over 1 hr or **IM** as single dose or 2 divided doses

Acute lead encephalopathy (blood levels >70 mcg/dl)

- **Adult/adolescent/child/infant: IM/IV** 1500 mg/m^2 as **IV INF** over 12-24 hr in combination with dimercaprol **IM**, give 1st dose ≥4 hr after initial dimercaprol, when urine flow established

efavirenz (Rx)

(ef-ah-veer'enz)

Sustiva

Func. class.: Antiretroviral

Chem. class.: Nonnucleoside reverse transcriptase inhibitor (NNRTI)

ACTION: Binds directly to reverse transcriptase and blocks RNA, DNA polymerase, thus causing a disruption of the enzyme's site

USES: HIV-1 in combination with at least 2 other antivirals

Unlabeled uses: HIV prophylaxis

CONTRAINDICATIONS: Pregnancy (D), hypersensitivity

Precautions: Breastfeeding, children <3 yr, renal/hepatic disease, myelosuppression, depression, seizures

DOSAGE AND ROUTES

Given in combination with protease inhibitor or nucleoside analog reverse transcriptase inhibitors (NARTIs)

- **Adult and child >40 kg: PO** 600 mg/day at bedtime
- **Child ≥3 yr, 32.5-39.9 kg: PO** 400 mg/day at bedtime
- **Child ≥3 yr, 25-32.4 kg: PO** 350 mg/day at bedtime
- **Child ≥3 yr, 20-24.9 kg: PO** 300 mg/day at bedtime
- **Child ≥3 yr, 15-19.9 kg: PO** 250 mg/day at bedtime
- **Child ≥3 yr, 10-14.9 kg: PO** 200 mg/day at bedtime

Available forms: Caps 50, 100, 200 mg; 600-mg tabs

Administer:

- Give on empty stomach; give at bedtime to decrease CNS side effects
- Caps may be opened, added to grape jelly to disguise peppery taste

SIDE EFFECTS

CNS: Fatigue, impaired cognition, insomnia, abnormal dreams, depression, headache, dizziness, anxiety, drowsiness

GI: *Diarrhea,* abdominal pain, *nausea,* hyperlipidemia, constipation, increased LFTs

GU: Hematuria, kidney stones

INTEG: Rash, erythema multiforme, Stevens-Johnson syndrome, toxic epidermal necrolysis, exfoliative dermatitis

PHARMACOKINETICS

Peak 3-5 hr, well absorbed, metabolized by liver; terminal half-life 52-76 hr; >99% protein binding, excreted in urine, feces; concentrations higher in females and those of African, Asian, and Hispanic descent

INTERACTIONS

- Avoid use with boceprevir, delavirdine, rilpivirine; dosage change may be needed if given with telaprevir
- Do not give together with benzodiazepines, ergots, midazolam, triazolam, cisapride

Increase: CNS depression—alcohol, antidepressants, antihistamines, opioids

Increase: levels of both products—ritonavir, estrogens, anticonvulsants

Increase: levels of warfarin, statins (except pravastatin, fluvastatin)

Decrease: levels of indinavir, amprenavir, lopinavir, oral contraceptives, nonoral contraceptives, ketoconazole, itraconazole, posaconazole, voriconazole, saquinavir, clarithromycin, methadone

Decrease: efavirenz metabolism—CYP3A4 inhibitors (conivaptan, ambrisentan, sorafenib)

Decrease: efavirenz effect—CYP3A4 inducers (carBAMazepine, rifamycins)

Drug/Herb

Decrease: efavirenz level—St. John's wort; do not use together

Drug/Food

Increase: absorption—high-fat foods

Drug/Lab Test

Increase: ALT

False positive: cannibinoids

NURSING CONSIDERATIONS

Assess:

- **Pregnancy:** Rule out pregnancy (D) before starting treatment; a type of contraception is needed, oral/nonoral contraceptives are decreased
- Bowel pattern before, during treatment; if severe abdominal pain with bleeding occurs, product should be discontinued; monitor hydration
- **Serious skin reactions:** Stevens-Johnson syndrome, toxic epidermal necrolysis
- **HIV:** Monitor CBC, blood chemistry, plasma HIV RNA, absolute CD4+/CD8+ cell counts/%, serum β_2 microglobulin, serum ICD+24 antigen levels, cholesterol, hepatic enzymes
- **Signs of toxicity:** severe nausea/vomiting, maculopapular rash

Evaluate:

- Therapeutic response: increased CD4 cell counts; decreased viral load; slowing progression of HIV

Teach patient/family:

- To take as prescribed; if dose is missed, to take as soon as remembered; not to double dose; to take with water, juice; to take on empty stomach at bedtime
- To make sure health care provider knows all medications, supplements, OTC products taken
- That, if severe rash occurs, to notify health care provider; that adverse reactions (rash, dizziness, abnormal dreams, insomnia) lessen after 1 mo
- Not to breastfeed or become pregnant if taking this product; to use nonhormonal contraception because serious birth defects have occurred (pregnancy D)
- To avoid hazardous activities if dizziness, drowsiness occur
- That product does not cure disease but controls symptoms; that HIV can be transmitted to others even while taking this product; to continue with safe-sex practices

eletriptan (Rx)

(el-ee-trip'tan)

Relpax

Func. class.: Antimigraine agent, abortive

Chem. class.: 5-HT_1-1B/1D receptor agonist, triptan

E

ACTION: Binds selectively to the vascular 5-HT_1-receptor subtype; causes vasoconstriction in cranial arteries

USES: Acute treatment of migraine with/without aura

CONTRAINDICATIONS: Hypersensitivity, coronary artery vasospasm, peripheral vascular disease, hemiplegic/basilar migraine, uncontrolled hypertension; ischemic bowel, heart disease; severe renal/hepatic disease, acute MI, stroke, angina, CV disease

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, postmenopausal women, men >40 yr; risk factors of CAD, MI, or other cardiac disease; hypercholesterolemia, obesity, diabetes, impaired renal/hepatic function

DOSAGE AND ROUTES

- **Adult: PO** 20 or 40 mg, may increase if needed, max 40 mg (single dose); may repeat in 2 hr if headache improves but returns, max 80 mg/24 hr

Available forms: Tabs 20, 40 mg

Administer:

- Swallow tabs whole; do not break, crush, or chew, use with 8 oz of water
- At beginning of headache; if headache returns, repeat dose after 2 hr of 1st dose if 1st dose is ineffective

SIDE EFFECTS

CNS: *Dizziness,* headache, anxiety, paresthesia, asthenia, somnolence, flushing, fatigue, hot/cold sensation, chills, vertigo, hypertonia, seizures, serotonin syndrome

CV: Chest pain, palpitations, hypertension, MI, sinus tachycardia, stroke, ventricular fibrillation/tachycardia, atrial fibrillation, AV block, bradycardia, chest pressure syndrome, coronary vasospasm
GI: Nausea, dry mouth, vomiting
MS: *Weakness*, back pain
RESP: Chest tightness, pressure

PHARMACOKINETICS

Onset of pain relief 2 hr, metabolized in the liver, 70% excreted in urine and feces

INTERACTIONS

Increase: plasma concentration of eletriptan—CYP3A4 inhibitors (clarithromycin, erythromycin, itraconazole, ketoconazole, nelfinavir, ritonavir), propranolol, ergots
Increase: serotonin syndrome—SSRIs, SNRIs, serotonin-receptor agonists

NURSING CONSIDERATIONS

Assess:
- **Migraine:** pain location, character, intensity, nausea, vomiting, aura; quiet, calm environment with decreased stimulation from noise, bright light, excessive talking
- B/P; signs, symptoms of coronary vasospasms, geriatric patients may be at higher risk
- Tingling, hot sensation, burning, feeling of pressure, numbness, flushing
- Stress level, activity, recreation, coping mechanisms
- Neurologic status: LOC, blurring vision, nausea, vomiting, tingling in extremities preceding headache
- Ingestion of tyramine foods (pickled products, beer, wine, aged cheese), food additives, preservatives, colorings, artificial sweeteners, chocolate, caffeine, which may precipitate these types of headaches
- Patients with CAD risk factors; 1st dose should be administered in prescriber's office or medical facility

Evaluate:
- Therapeutic response: decrease in frequency, severity of migraine

Teach patient/family:
- To report any side effects to prescriber
- To use contraception while taking product; to inform prescriber if pregnant or intending to become pregnant
- To provide dark, quiet environment
- That product does not prevent or reduce number of migraine attacks

RARELY USED

eltrombopag

(ell-trom-bow'pag)
Promacta
Func. class.: Hematopoietic

USES: Thrombocytopenia in chronic immune thrombocytopenic purpura when unresponsive to other treatment, chronic hepatitis C-associated thrombocytopenia

CONTRAINDICATIONS: Hypersensitivity
Black Box Warning: Hepatotoxicity

DOSAGE AND ROUTES

- **Adult: PO** 50 mg/day, adjust dosage to maintain platelets at $\geq 50 \times 10^9$, max 75 mg/day; 100 mg/day chronic hepatitis C

emedastine ophthalmic

See Appendix B

emtricitabine (Rx)

(em-tri-sit'uh-bean)
Emtriva
Func. class.: Antiretroviral
Chem. class.: Nucleoside reverse transcriptase inhibitor (NRTI)

ACTION: A synthetic nucleoside analog of cytosine; inhibits replication of HIV virus by competing with the natural sub-

strate and then becoming incorporated into cellular DNA by viral reverse transcriptase, thereby terminating cellular DNA chain

USES: HIV-1 infection with other antiretroviral
Unlabeled uses: HBV (hepatitis B virus) infection with HIV, HIV prophylaxis

CONTRAINDICATIONS

CONTRAINDICATIONS: Hypersensitivity

Black Box Warning: Lactic acidosis

Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, renal disease

Black Box Warning: Hepatic insufficiency, chronic hepatitis B virus (HPV)

DOSAGE AND ROUTES

Oral cap and solution are not interchangeable

- **Adult: PO** Caps 200 mg/day; oral sol 240 mg (24 ml)/day
- **Adolescent/child >33 kg: PO** Caps 200 mg/day; **child 3 mo-17 yr:** oral sol 6 mg/kg/day, max 240 mg (24 ml)
- **Infants <3 mo: PO oral sol** 3 mg/kg daily, do not use caps

Renal dose

- **Adult: PO** Caps CCr 30-49 ml/min, 200 mg q48hr; oral sol 120 mg q24hr; caps CCr 15-29 ml/min, 200 mg q72hr; oral sol 80 mg q24hr; caps CCr <15 ml/min, 200 mg q96hr; oral sol 60 mg q24hr

Available forms: Cap 200 mg; oral sol 10 mg/ml
Administer:

- Give without regard to meals
- Oral cap and solution not interchangeable
- Storage (caps) at 25° C (77° F); (oral sol) refrigerated, use within 3 mo

SIDE EFFECTS

CNS: *Headache,* abnormal dreams, *depression,* dizziness, *insomnia,* neuropathy, paresthesia, *asthenia*
GI: *Nausea, vomiting, diarrhea, anorexia, abdominal pain, dyspepsia,* hepatomegaly with steatosis (may be fatal)
INTEG: *Rash,* skin discolorization
MS: Arthralgia, myalgia
RESP: *Cough*
SYST: Change in body fat distribution, lactic acidosis

PHARMACOKINETICS

Rapidly, extensively absorbed; peak 1-2 hr; protein binding <4%; excreted unchanged in urine (86%), feces (14%); half-life 10 hr

INTERACTIONS

- Do not use with efavirenz, tenofovir, lamiVUDine, treatment duplication

Decrease: emtricitabine level—interferons

- Complex interactions—ribavirin, cautious use

NURSING CONSIDERATIONS

Assess:

- Renal/hepatic function tests: AST, ALT, bilirubin, amylase, lipase, triglycerides periodically during treatment

Black Box Warning: Lactic acidosis, severe hepatomegaly with steatosis; if lab reports confirm these conditions, discontinue treatment; may be fatal

Black Box Warning: Hepatotoxicity: do not use in those with risk factors such as alcoholism, discontinue if hepatotoxicity occurs

Black Box Warning: Hepatitis B and HIV coinfection (unlabeled); perform HBV screening in any patient who has HIV to ensure appropriate treatment; avoid single-drug treatments in HBV

Evaluate:

- Therapeutic response: decreased signs, symptoms of HIV; decreased viral load, increased CP4 counts

Teach patient/family:

- That GI complaints resolve after 3-4 wk of treatment

- To report planned or suspected pregnancy; not to breastfeed while taking product
- That product must be taken at same time of day to maintain blood level
- That product will control symptoms but is not a cure for HIV; patient still infectious, may pass HIV virus on to others; that other products may be necessary to prevent other infections
- That changes in body fat distribution may occur

Black Box Warning: Lactic acidosis: to notify prescriber immediately if fatigue, muscle aches/pains, abdominal pain, difficulty breathing, nausea, vomiting, change in heart rhythm occur

Black Box Warning: Hepatotoxicity: to notify prescriber of dark urine, yellowing of skin/eyes, clay-colored stools, anorexia, nausea, vomiting

enalapril/enalaprilat (Rx)

(e-nal′a-pril)/(e-nal′a-pril-at)

Vasotec

Func. class.: Antihypertensive

Chem. class.: Angiotensin-converting enzyme (ACE) inhibitor

Do not confuse:
enalapril/ramipril/Anafranil/Eldepryl

ACTION: Selectively suppresses renin-angiotensin-aldosterone system; inhibits ACE; prevents conversion of angiotensin I to angiotensin II, dilation of arterial, venous vessels

USES: Hypertension, CHF, left ventricular dysfunction
Unlabeled uses: Diabetic nephropathy, hypertensive emergency/urgency, post-MI, proteinuria, renal crisis in scleroderma

CONTRAINDICATIONS: Hypersensitivity, history of angioedema

Black Box Warning: Pregnancy (D)

Precautions: Breastfeeding, renal disease, hyperkalemia, hepatic failure, dehydration, bilateral renal artery stenosis

DOSAGE AND ROUTES

Hypertension
- **Adult: PO** 2.5-5 mg/day, may increase or decrease to desired response, range 10-40 mg/day; **IV** 0.625-1.25 mg q6hr over 5 min
- **Child: PO** 0.08 mg/kg/day in 1-2 divided doses, max 0.58 mg/kg/day
- **Child: IV** 5-10 mcg/kg/dose q8-24hr

CHF
- **Adult: PO** 2.5-20 mg/day in 2 divided doses, max 40 mg/day in divided doses

Renal disease
- **Adult: PO** 2.5 mg/day (CCr <30 ml/min), increase gradually; **IV** CCr >30 ml/min, 1.25 mg q6hr; CCr <30 ml/min, 0.625 mg as one-time dose, increase as per B/P

Hypertensive emergency/urgency (unlabeled)
- **Adult: IV** 1.25-5 mg q6hr

Available forms: *Enalapril:* tabs 2.5, 5, 10, 20 mg; *enalaprilat:* inj 1.25 mg/ml

Administer:

PO route
- Tab may be crushed, given without regard to meals

IV route
- Prepare in sterile environment using aseptic technique
- Dilute each dose with ≤50 ml compatible sol
- For 25 mcg/ml dilution often used for neonatal or pediatric patients, combine 1 ml enalaprilat 1.25 mg/ml and 49 ml compatible sol for IV

IV, Direct/Intermittent IV INF route
- Undiluted over ≥5 min, use diluent provided or 50 ml D_5W, 0.9% NaCl, 0.9% NaCl in D_5W or LR, Isolyte E; give through Y-tube of free-flowing inf of 0.9% NaCl, D_5W, LR, Isolyte E

Y-site compatibilities: Acyclovir, alemtuzumab, alfentanil, allopurinol, amifostine, amikacin, aminophylline, amphotericin B liposome, anidulafungin, ascorbic acid,

atracurium, atropine, azaTHIOprine, aztreonam, benztropine, bivalirudin, bretylium, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, ceFAZolin, cefonicid, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, cefTAZidime, ceftizoxime, cefTRIAXone, cefuroxime, cephalothin, cephapirin, chloramphenicol, cimetidine, cisatracurium, cladribine, clindamycin, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, dexmedetomidine, dextran 40, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, doripenem, doxacurium, DOXOrubicin, DOXOrubicin liposome, doxycycline, ePHEDrine, EPINEPHrine, epirubicin, epoetin, ertapenem, erythromycin, esmolol, etoposide, etoposide phosphate, famotidine, fenoldopam, fentaNYL, filgrastim, fluconazole, fludarabine, fluorouracil, folic acid, furosemide, ganciclovir, gemcitabine, gentamicin, granisetron, heparin, hydrocortisone, HYDROmorphone, ifosfamide, imipenem-cilastatin, indomethacin, insulin, isoproterenol, ketorolac, labetalol, levofloxacin, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, melphalan, meperidine, meropenem, metaraminol, methicillin, methotrexate, methoxamine, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, mezlocillin, miconazole, midazolam, milrinone, minocycline, mitoXANtrone, morphine, moxalactam, multiple vitamin injection, nafcillin, nalbuphine, naloxone, netilmicin, niCARdipine, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxacillin, oxaliplatin, oxytocin, PACLitaxel, palonosetron, papaverine, PEMEtrexed, penicillin G potassium, pentamidine, pentazocine, PENTobarbital, PHENobarbital, phentolamine, phenylephrine, phytonadione, piperacillin-tazobactam, potassium chloride/phosphate, procainamide, prochlorperazine, promethazine, propofol, propranolol, protamine, pyridoxine, quinupristin-dalfopristin, ranitidine, remifentanil, ritodrine, riTUXimab, rocuronium, sodium acetate, sodium bicarbonate, succinylcholine, SUFentanil, tacrolimus, teniposide, tetracycline, theophylline, thiamine, thiotepa, ticarcillin/clavulanate, tigecycline, tirofiban, tobramycin, tolazoline, trastuzumab, trimetaphan, urokinase, vancomycin, vasopressin, vecuronium, verapamil, vinCRIStine, vinorelbine, voriconazole, zoledronic acid

Additive compatibilities: DOBUTamine, DOPamine, heparin, meropenem, nitroglycerin, nitroprusside, potassium chloride

E

SIDE EFFECTS

CNS: *Insomnia, dizziness,* paresthesias, headache, fatigue, anxiety

CV: *Hypotension,* chest pain, tachycardia, dysrhythmias, syncope, angina, MI, orthostatic hypotension

EENT: *Tinnitus;* visual changes; sore throat; double vision; dry, burning eyes

GI: Nausea, vomiting, colitis, cramps, diarrhea, constipation, flatulence, dry mouth, loss of taste

GU: Proteinuria, renal failure, increased frequency of polyuria or oliguria

HEMA: Agranulocytosis, neutropenia

INTEG: Rash, purpura, alopecia, hyperhidrosis, photosensitivity

META: Hyperkalemia

RESP: Dyspnea, dry cough, crackles

SYST: Toxic epidermal necrolysis, Stevens-Johnson syndrome, angioedema

PHARMACOKINETICS

Enalapril: PO: Onset 1 hr, peak 4-6 hr, duration ≥24 hr

Enalaprilat: IV: Onset 5-15 min, peak up to 4 hr, duration 4-6 hr, half-life 11 hr

Metabolized by liver to active metabolite, excreted in urine

INTERACTIONS

Increase: hypersensitivity—allopurinol

Increase: hypotension—diuretics, other antihypertensives, phenothiazines, nitrates, acute alcohol ingestion, general anesthesia

Increase: potassium levels—salt substitutes, potassium-sparing diuretics, potassium supplements, cycloSPORINE, indomethacin
Increase: levels of lithium, digoxin
Decrease: effects of enalapril—antacids, rifampin
Drug/Lab Test
Increase: ALT, AST, bilirubin, alk phos, glucose, uric acid
False positive: ANA titer

NURSING CONSIDERATIONS

Assess:
• **Bone marrow depression (rare):** neutrophils, decreased platelets; WBC with differential baseline, q3mo; if neutrophils $<1000/mm^3$, discontinue treatment (recommended with collagen-vascular disease)
• **Hypertension:** B/P, peak/trough level, orthostatic hypotension, syncope when used with diuretic, pulse q4hr; note rate, rhythm, quality
• Baselines of renal, hepatic studies before therapy begins and 1 wk into therapy; electrolytes: potassium, sodium, chloride during 1st 2 wk of therapy
• Skin turgor, dryness of mucous membranes for hydration status; edema in feet, legs daily
• **Symptoms of CHF:** edema, dyspnea, wet crackles, weight gain, jugular venous distension, difficulty breathing
Evaluate:
• Therapeutic response: decreased B/P
Teach patient/family:
• Not to use OTC (cough, cold, or allergy) products unless directed by prescriber; to avoid potassium, salt substitutes
• To avoid sunlight or wear sunscreen for photosensitivity
• To comply with dosage schedule even if feeling better
• To notify prescriber of mouth sores, sore throat, fever, swelling of hands or feet, irregular heartbeat, chest pain, signs of angioedema
• That excessive perspiration, dehydration, vomiting, diarrhea may lead to fall in blood pressure; to consult prescriber if these occur
• That product may cause dizziness, fainting; that lightheadedness may occur during 1st few days of therapy
• That product may cause skin rash, impaired perspiration or angioedema; to discontinue if angioedema occurs
• Not to discontinue product abruptly
• That CV adverse reactions may reoccur
• To rise slowly to sitting or standing position to minimize orthostatic hypotension

Black Box Warning: To notify prescriber if pregnancy is planned or suspected; to use contraception during treatment; pregnancy (D)

TREATMENT OF OVERDOSE:

Lavage, IV atropine for bradycardia, IV theophylline for bronchospasm, digoxin, O_2, diuretic for cardiac failure

enfuvirtide (Rx)

(en-fyoo'vir-tide)
Fuzeon
Func. class.: Antiretroviral
Chem. class.: Fusion Inhibitor

ACTION: Inhibitor of the fusion of HIV-1 with CD4+ cells

USES: Treatment of HIV-1 infection in combination with other antiretrovirals
Unlabeled uses: HIV prophylaxis after occupational exposure

CONTRAINDICATIONS: Breast-feeding, hypersensitivity
Precautions: Pregnancy (B), children <6 yr, liver disease, myelosuppression, infections

DOSAGE AND ROUTES

• **Adult: SUBCUT** 90 mg (1 ml) bid
• **Child 6-16 yr and <42.6 kg: SUBCUT** 2 mg/kg bid, max 90 mg bid; 11-15.5 kg 27 mg/0.3 ml bid; 15.6-20 kg 36 mg/0.4 ml

bid; 20.1-24.5 kg 45 mg/0.5 ml bid; 24.6-29 kg 54 mg/0.6 ml bid; 29.1-33.5 kg 63 mg/0.7 ml bid; 33.6-38 kg 72 mg/0.8 ml bid; 38.1-42.5 kg 81 mg/0.9 ml bid

HIV prophylaxis (unlabeled)

- **Adult: SUBCUT** 90 mg bid added to PEP regimen

Available forms: Powder for inj, lyophilized 108 mg (90 mg/ml when reconstituted)

Administer:

SUBCUT route

- **Reconstitute** vial with 1.1 ml sterile water for inj; tap and roll to mix; allow to stand until completely dissolved, may take up to 45 min; after dissolved, immediately inject or refrigerate up to 24 hr
- Do not mix with other medications
- SUBCUT: give bid, rotate sites; preferred sites: upper arm, anterior thigh, abdomen

SIDE EFFECTS

CNS: Anxiety, peripheral neuropathy, taste disturbance, Guillain-Barré syndrome, insomnia, depression

GI: Abdominal pain, anorexia, constipation, pancreatitis

GU: Glomerulonephritis, renal failure

HEMA: Thrombocytopenia, neutropenia

INTEG: *Inj site reactions*

MISC: Influenza, cough, conjunctivitis, lymphadenopathy, myalgia, hyperglycemia, pneumonia, rhinitis, fatigue, hypersensitivity

PHARMACOKINETICS

Peak 8 hr, terminal half-life 3.8 hr, well absorbed, undergoes catabolism, 92% protein binding

NURSING CONSIDERATIONS

Assess:

- **Signs of infection, inj site reactions**
- **Glomerulonephritis/renal failure:** BUN, creatinine, renal failure may occur
- Bowel pattern before, during treatment; if severe abdominal pain or constipation occurs, notify prescriber; monitor hydration
- Skin eruptions, rash, urticaria, itching
- Allergies before treatment, reaction to each medication
- **Immune reconstitution syndrome:** with combination theory
- **HIV:** CBC, blood chemistry, plasma HIV RNA, absolute CD4+/CD8+ cell counts/%, serum β_2 microglobulin, serum ICD+24 antigen levels, cholesterol

Evaluate:

- Therapeutic response: increased CD4 cell counts; decreased viral load; slowing progression of HIV-1 infection

Teach patient/family:

- To notify prescriber if pregnancy is suspected or if breastfeeding
- That pneumonia may occur; to contact prescriber if cough, fever occur
- That hypersensitive reactions may occur; rash, pruritus; to stop product, contact prescriber
- That product is not a cure for HIV-1 infection but controls symptoms; HIV-1 can still be transmitted to others; that product is to be used in combination only with other antiretrovirals

⚠ HIGH ALERT

enoxaparin (Rx)

(ee-nox'a-par-in)

Lovenox

Func. class.: Anticoagulant, antithrombotic

Chem. class.: Low-molecular-weight heparin (LMWH)

Do not confuse:

enoxaparin/enoxacin

Lovenox/Lotronex

ACTION: Binds to antithrombin III inactivating factors Xa/IIa, thereby resulting in a higher ratio of anti-factor Xa to IIa

USES: Prevention of DVT (inpatient or outpatient), PE (inpatient) in hip and knee replacement, abdominal surgery at risk for thrombosis; unstable angina/non–Q-wave MI

Unlabeled uses: Antiphospholipid antibody syndrome, arterial thromboembolism prophylaxis, cerebral thromboembolism, percutaneous coronary intervention

CONTRAINDICATIONS:

Hypersensitivity to this product, benzyl alcohol, heparin, pork; active major bleeding, hemophilia, leukemia with bleeding, peptic ulcer disease, thrombocytopenic purpura, heparin-induced thrombocytopenia

Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, low weight men (<57 kg), women (<45 kg), severe renal/hepatic disease, blood dyscrasias, severe hypertension, subacute bacterial endocarditis, acute nephritis, recent burn, spinal surgery, indwelling catheters

Black Box Warning: Lumbar puncture, epidural anesthesia, spinal anesthesia

DOSAGE AND ROUTES

DVT prevention before hip or knee surgery

- **Adult: SUBCUT** 30 mg bid given 12-24 hr postop for 7-10 days until DVT risk is diminished

DVT prevention before hip replacement

- **Adult: SUBCUT** 40 mg/day started 9-15 hr preop or 30 mg q12hr started 12-24 hr postop, continued until DVT risk diminished or patient adequately on anticoagulant

DVT prophylaxis before abdominal surgery

- **Adult: SUBCUT** 40 mg/day starting 24 hr prior to surgery × 7-10 days to prevent thromboembolic complications

Treatment of DVT or PE

- **Adult: SUBCUT** 1 mg/kg q12hr (without PE, outpatient); 1 mg/kg q12hr or 1.5 mg/kg/day (with or without PE, inpatient); warfarin should be started within 72 hr, continued ≥5 days until INR is 2-3 (usually 7 days)

Prevention of ischemic complications in unstable angina or non–Q-wave MI

- **Adult: SUBCUT/IV** 1 mg/kg q12hr until stable with aspirin 100-325 mg/day × ≥2 days

Renal dose

- **Adult: SUBCUT** <30 ml/min 30 mg/day (thrombosis prophylaxis)

Available forms: Prefilled syringes/inj 30 mg/0.3 ml, 40 mg/0.4 ml, 60 mg/0.6 ml, 80 mg/0.8 ml, 100 mg/1 ml, 120 mg/0.8 ml, 150 mg/ml; multidose vials 100 mg/ml (3 ml)

Administer:

- Only after screening patient for bleeding disorders
- Do not mix with other products or inf fluids

⚠ Only this product when ordered; not interchangeable with heparin or other LMWHs

- At same time each day to maintain steady blood levels
- Avoid all IM inj that may cause bleeding
- Prepare in a sterile environment using aseptic technique
- Dilution may be stored for up to 4 wk in glass vial at room temp, up to 2 wk in TB syringes with rubber stoppers at room temp or refrigerated

SUBCUT route

- Do not give IM; begin 1 hr prior to surgery; do not aspirate; rotate sites; do not expel bubble from syringe before administration
- To recumbent patient, give SUBCUT; rotate inj sites (left/right anterolateral, left/right posterolateral abdominal wall)
- Insert whole length of needle into skin fold held with thumb and forefinger
- If withdrawing from multidose vial, use TB syringe for proper measurement
- Prefilled syringes (30, 40 mg) not graduated; do not use for partial doses
- Do not administer if particulate is present

Direct IV route

- Use multidose vial for IV administration; use TB syringe, other graduated sy-

ringe to measure dose; give IV BOL through IV line, flush after

SIDE EFFECTS

CNS: Fever, confusion
GI: Nausea
HEMA: Hemorrhage, hypochromic anemia, thrombocytopenia, bleeding
INTEG: Ecchymosis, inj site hematoma
META: Hyperkalemia in renal failure
SYST: Edema, peripheral edema

PHARMACOKINETICS

SUBCUT: 90% absorbed, maximum antithrombin activity (3-5 hr), elimination half-life 4½ hr, excreted in urine

INTERACTIONS

Increase: enoxaparin action—anticoagulants, salicylates, NSAIDs, antiplatelets, thrombolytics
Drug/Lab Test
Increase: AST, ALT
Decrease: platelet count

NURSING CONSIDERATIONS

Assess:
- Blood studies (Hct/Hgb, CBC, coagulation studies, platelets, occult blood in stools), anti-factor Xa (should be checked 4 hr after inj); thrombocytopenia may occur
- Renal studies: BUN/creatinine baseline and periodically
- **Bleeding:** gums, petechiae, ecchymosis, black tarry stools, hematuria; notify prescriber

Black Box Warning: Neurologic symptoms in patients who have received spinal anesthesia

Perform/provide:
- Storage at 77° F (25° C); do not freeze

Evaluate:
- Therapeutic response: prevention of DVT

Teach patient/family:
- To use soft-bristle toothbrush to avoid bleeding gums; to use electric razor
- To report any signs of bleeding: gums, under skin, urine, stools
- To avoid OTC products containing aspirin unless approved by prescriber

TREATMENT OF OVERDOSE:

Protamine SO_4 1% sol; dose should equal dose of enoxaparin

E

entacapone (Rx)

(en'ta-kah-pone)
Comtan
Func. class.: Antiparkinson agent
Chem. class.: COMT inhibitor

ACTION: Inhibits COMT (catechol *O*-methyltransferase) and alters the plasma pharmacokinetics of levodopa; given with levodopa/carbidopa

USES: Parkinson's disease for those experiencing end of dose; decreased effect as adjunct to levodopa/carbidopa

CONTRAINDICATIONS: Hypersensitivity
Precautions: Pregnancy (C), breastfeeding, children, renal/hepatic disease, affective disorders, psychosis

DOSAGE AND ROUTES

- **Adult: PO** 200 mg given with carbidopa/levodopa, max 1600 mg/day; may allow for 25% dosage reduction in levodopa therapy

Available forms: Tabs, film coated 200 mg
Administer:
- Only after MAOIs have been discontinued for 2 wk
- Give with dose of levodopa/carbidopa; product has no effect on its own

SIDE EFFECTS

CNS: *Involuntary choreiform movements, hand tremors, fatigue, headache, anxiety, twitching, numbness, dyskinesia, hypokinesia, hyperkinesia, weakness, confusion, agitation, nightmares,* psychosis, hallucination, hypo-

mania, severe depression, dizziness, neuroleptic malignant syndrome
CV: *Orthostatic hypotension*
GI: *Nausea, vomiting, anorexia, abdominal distress, dry mouth, flatulence, bitter taste, diarrhea, constipation, dyspepsia,* gastritis, GI disorder
INTEG: Rash, sweating, alopecia
MISC: Dark urine and other body fluids, back pain, dyspnea, purpura, fatigue, asthenia, bacterial infection, rhabdomyolysis

PHARMACOKINETICS

Duration up to 8 hr; excreted in urine, feces; well absorbed; protein binding 98%; metabolized in liver extensively; enters breast milk; half-life of levodopa extended, half-life 0.5 hr initial, 2.5 hr second

INTERACTIONS

• Prevents catecholamine metabolism—nonselective MAOIs; do not use together
Increase: B/P, tachycardia, dysrhythmias, avoid use—bitolterol, DOPamine, DOBUTamine, EPINEPHrine, methyldopa, isoetharine, norepinephrine
Decrease: excretion of entacapone—ampicillin, chloramphenicol, probenecid, erythromycin, rifampin
Drug/Herb
Increase: B/P—ma huang
Decrease: effect—kava

NURSING CONSIDERATIONS

Assess:
⚠ **Neuroleptic malignant syndrome:** high temp, increased CPK, rigidity, change in LOC usually during rapid withdrawal
• **Involuntary movements of Parkinson's disease:** akinesia, tremors, staggering gait, muscle rigidity, drooling when given with levodopa/carbidopa
• B/P, respirations during initial treatment
• Mental status: affect, mood, behavioral changes, depression; complete suicide assessment
• **Rhabdomyolysis:** muscle pain, tenderness, weakness; swelling of affected muscles; may lead to decreased B/P, shock
Perform/provide:
• Assistance with ambulation during beginning therapy
Evaluate:
• Therapeutic response: decrease in akathisia, increased mood when given with levodopa/carbidopa
Teach patient/family:
• That hallucinations, mental changes, nausea, dyskinesia can occur; may mean patient is overmedicated
• To change positions slowly to prevent orthostatic hypotension; not to drive, operate machinery until stabilized on medication and mental performance not affected
• To use product exactly as prescribed; if dose is missed, to take as soon as remembered up to 2 hr before next dose; not to discontinue abruptly; to withdraw gradually
• That urine, sweat may darken
• To notify prescriber if pregnancy is suspected; if lactating, that product excreted in breast milk

entecavir (Rx)

(en-te'ka-veer)
Baraclude
Func. class.: Antiretroviral nucleoside reverse transcriptase inhibitor (NRTIs)
Chem. class.: Guanosine nucleoside analog

ACTION: Inhibits hepatitis B virus DNA polymerase by competing with natural substrates and by causing DNA termination after its incorporation into viral DNA; causes viral DNA death

USES: Chronic hepatitis B (HBV)

CONTRAINDICATIONS: Hypersensitivity
Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, severe renal disease
Black Box Warning: Hepatic disease, hepatitis, HIV, lactic acidosis

DOSAGE AND ROUTES

Chronic hepatitis B (nucleoside treatment naive)

• **Adult and adolescent ≥16 yr: PO** 0.5 mg/day

Chronic hepatitis B with compensated liver disease and history of hepatitis B viremia while receiving lamivudine or known lamivudine/telbivudine-resistant mutations

• **Adult and adolescent ≥16 yr: PO** 1 mg/day

Renal dose

• **Adult: PO** CCr ≥50 ml/min, 0.5 mg/day; CCr 30-49 ml/min, 0.25 mg/day, 0.5 mg/day or 1 mg q48hr for lamiVUDine-refractory patient; CCr 10-29 ml/min, 0.15/day, 0.3 mg or 1 mg q72hr for lamiVUDine-refractory patient; CCr <10 ml/min, 0.05 mg/day, 0.1 mg/day or 1 mg q7days for lamiVUDine-refractory patient

Available forms: Tabs, film coated 0.5, 1 mg; oral sol 0.05 mg/ml

Administer:

• After hemodialysis

• By mouth on empty stomach 2 hr before or after food

• Store at room temperature

• **Oral liquid:** use calibrated oral dosing spoon provided; may be used interchangeably with tabs

SIDE EFFECTS

CNS: *Headache,* fatigue, dizziness, insomnia

ENDO: Hyperglycemia

GI: *Dyspepsia,* nausea, vomiting, diarrhea, elevated liver function enzymes

INTEG: Alopecia, rash

SYST: Lactic acidosis, severe hepatomegaly with steatosis

PHARMACOKINETICS

Peak 0.5-1.5 hr, steady state 6-10 days, 100% bioavailability, extensively distributed to tissues, protein binding 13%, terminal half-life 128-149 hr, excreted unchanged (62%-73%) via kidneys

INTERACTIONS

Drug/Food

Decrease: absorption—high-fat meal

Drug/Lab Test

Increase: ALT, AST, total bilirubin, amylase, lipase, creatinine, blood glucose, urine glucose

Decrease: platelets, albumin

NURSING CONSIDERATIONS

Assess:

• For nephrotoxicity: increasing CCr, BUN

Black Box Warning: For HIV before beginning treatment because HIV resistance may occur in chronic hepatitis B patients; monitor HIV RNA

Black Box Warning: For lactic acidosis, severe hepatomegaly with stenosis; increased serum lactate, increased hepatic enzymes, palpate line; discontinue if present

• Geriatric patients more carefully; may develop renal, cardiac symptoms more rapidly

Black Box Warning: For exacerbations of hepatitis (jaundice, pruritus, fatigue) after discontinuing treatment, monitor LFTs

Evaluate:

• Therapeutic response: decreased symptoms of chronic hepatitis B, improving LFTs

Teach patient/family:

• Not to take with food

• To take exactly as prescribed

• Not to stop medication without approval of prescriber

• That optimal duration of treatment is unknown

• To avoid use with other medications unless approved by prescriber

• To notify prescriber of decreased urinary output, blood in urine

Black Box Warning: Symptoms of lactic acidosis: muscle pain, severe tiredness, weakness, trouble breathing, stomach pain with nausea/vomiting, coldness in arms/legs, fast/irregular heartbeat, dizziness

Black Box Warning: Symptoms of hepatotoxicity: eyes/skin turning yellow, dark urine, light bowel movements, no appetite for days, nausea, stomach pain

- That product does not cure but lowers amount of HBV in body
- That product does not stop spread of HBV to others by sex, sharing needles, or being exposed to blood
- Not to breastfeed

ePHEDrine nasal agent

See Appendix B

epinastine (ophthalmic)

(ep-ih-nas'teen)

Elestat

Func. class.: Antihistamine (ophthalmic)

Chem. class.: Histamine 1 receptor antagonist/mast cell stabilizer

ACTION: A topically active, direct H_1-receptor antagonist and mast cell stabilizer; by reducing these inflammatory mediators, it relieves the ocular pruritus associated with allergic conjunctivitis

USES: Prevention of ocular pruritus associated with signs and symptoms of allergic conjunctivitis

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (C), breastfeeding, children, contact lenses

DOSAGE AND ROUTES

- **Adult/child ≥3 yr: OPHTH** Instill 1 drop in each eye bid

Available forms: Ophthalmic sol 0.5%

Ophthalmic route

- For topical ophthalmic use only
- Wash hands before and after use. Tilt the head back slightly and pull the lower eyelid down with the index finger. Squeeze the prescribed number of drops into the conjunctival sac and gently close eyes for 1–2 min; do not blink
- Do not touch the tip of the dropper to the eye, fingertips, or other surface
- The preservative benzalkonium chloride may be absorbed by soft contact lenses. Wait ≥10 min after instilling the ophthalmic solution before inserting contact lenses; contact lenses should not be worn if eye is red
- Do not share ophthalmic drops with others
- Keep bottle tightly closed when not in use
- Treatment should be continued throughout the period of exposure (i.e., until the pollen season is over or until exposure to the offending allergen is terminated), even when symptoms are absent

SIDE EFFECTS

EENT: Ocular irritation, folliculosis, hyperemia, ocular pruritus

MISC: Infection (including cold symptoms and upper respiratory infections), headache, rhinitis, sinusitis, increased cough, pharyngitis

PHARMACOKINETICS

Onset 3-5 min, peak 2 hr, duration 8 hr

NURSING CONSIDERATIONS

Assess:

- Eyes: for itching, redness, use of soft or hard contact lenses

Evaluate:

- Therapeutic response: absence of redness, itching in the eyes

Teach patient/family:

Ophthalmic route

- Product is for topical ophthalmic use only
- Wash hands before and after use. Tilt the head back slightly and pull the lower eyelid down with the index finger. Squeeze the prescribed number of drops into the conjunctival sac and gently close eyes for 1–2 min; do not blink
- Do not touch the tip of the dropper to the eye, fingertips, or other surface
- Wait ≥10 min after instilling the oph-

thalmic solution before inserting contact lenses; contact lenses should not be worn if eye is red
• Keep bottle tightly closed when not in use
• Do not share ophthalmic drops with others
• Remove contact lenses before use because the preservative benzalkonium chloride may be absorbed by soft contact lenses; product should not be used to treat contact lens–related irritation

⚠ HIGH ALERT

EPINEPHrine (Rx)

(ep-i-nef'rin)

Adrenaclick, Primatene Mist, Twinject, Walgreens Bronchial Mist

EPINEPHrine HCL

Adrenalin, EpiPen, EpiPen Jr.

Func. class.: Bronchodilator nonselective adrenergic agonist, vasopressor

Chem. class.: Catecholamine

Do not confuse:
EPINEPHrine/ePHEDrine

ACTION: β_1- and β_2-agonist causing increased levels of cAMP, thereby producing bronchodilation, cardiac, and CNS stimulation; high doses cause vasoconstriction via α-receptors; low doses can cause vasodilation via β_2-vascular receptors

USES: Acute asthmatic attacks, hemostasis, bronchospasm, anaphylaxis, allergic reactions, cardiac arrest, adjunct in anesthesia, shock
Unlabeled uses: Bradycardia, chloroquine overdose

CONTRAINDICATIONS: Hypersensitivity to sympathomimetics, sulfites, closed-angle glaucoma, nonanaphylactic shock during general anesthesia

Precautions: Pregnancy (C), breastfeeding, cardiac disorders, hyperthyroidism, diabetes mellitus, prostatic hypertrophy, hypertension, organic brain syndrome, local anesthesia of certain areas, labor, cardiac dilation, coronary insufficiency, cerebral arteriosclerosis, organic heart disease

E

DOSAGE AND ROUTES

Anaphylaxis/severe asthma exacerbation
• **Adult: IM/SUBCUT** 0.3-0.5 mg, may repeat q10-15min (anaphylaxis) or q20min-4 hr (asthma)
Severe allergic reactions type I
• **Adult/child ≥30 kg: IM** 0.3 mg (EpiPen/EpiPen 2-Pak, 1:1000)
• **Child <30 kg: IM** 0.15 mg (EpiPen Jr/EpiPen Jr 2-Pak 1:2000)
• **Adult/child ≥66 lb: IM/SUBCUT** 0.3 mg (0.3 ml) initially (Twinject 1.1 ml 1:1000, 1 mg/ml, containing 2 doses of 0.3 mg)
• **Adult/child 33-66 lb: IM/SUBCUT** 0.15 mg (0.15 ml) initially, may give another 0.15 mg after 10 min (Twinject 1.1 ml 1:1000 [1 mg/ml] containing 2 doses of 0.15 mg)
Status asthmaticus
• **Adult/adolescent:** SUBCUT 0.3-0.5 mg (0.3-0.5 ml of the 1:1000 injection) q20min × 3 doses
• **Infant/child:** SUBCUT 0.01 mg/kg-0.5 mg q20min × 3 doses
Available forms: Nasal spray (sol) 1 mg/ml; sol for inj 1 mg/ml, 1:10,000, 1:1000; inh vapor (sol) 0.22 mg/actuation; pressurized inh (sol) 0.22 mg/actuation; sol for inj 0.15 mg/0.15 ml autoinjector, 0.3 mg/0.3 ml autoinjector, 0.15 mg/0.3 ml
Administer:
• Increased dose of insulin for diabetic patients if glucose is elevated
• Check for correct concentration, route, dosage before administering
• Give subcut, IM, intraosseously, IV; suspensions are for subcut use only; do not give IV

• Visually inspect parenteral products for particulate matter and discoloration before use; do not use sols that are pinkish to brownish or that contain a precipitate

• Avoid extravasation during parenteral administration; if extravasation occurs, infiltrate the affected area with phentolamine diluted in NS

Inhalation route

• Place in nebulizer (10 gtt of a 1% base sol)

• Dilute racepinephrine 2.25% sol

IM route

• EPINEPHrine injection should preferably be into the deltoid or anterior thigh (vastus lateralis). Do not administer into the gluteal muscle

• Twinject is light sensitive and should be stored in the carrying case provided. Do not refrigerate. Protect from freezing. Replace if solution is discolored or contains a precipitate

SUBCUT route

• Inject, taking care not to inject intradermally. Massage injection site well after use to enhance absorption and to decrease local vasoconstriction. Injection can cause tissue irritation

Intraosseous INF route (unlabeled)

• During CPR, the same EPINEPHrine dosage may be given via the intraosseous route when IV access is not available

Intracardiac route

• Intracardiac route should be reserved for extreme emergencies. Intracardiac injection should only be performed by properly trained medical personnel

Endotracheal route

• Per the ACLS or PALS guidelines, the EPINEPHrine parenteral product is administered via endotracheal (ET) route. ET administration should only be used if access to IV or intraosseous routes is not possible

• **Adult:** Dilute dose in 5–10 ml of NS or sterile distilled water. Administer via ET tube. Endotracheal absorption of EPINEPHrine may be improved by diluting with water instead of NS

• **Child:** After dose administration, flush the ET tube with a minimum of 5 ml NS

Direct IV INJ route

• Inject EPINEPHrine directly into a vein over 5–10 min for adults or 1–3 min for children. May be given IV push in cardiac arrest

• In neonates, may administer via the umbilical vein

• **During adult cardiopulmonary resuscitation (CPR):** Resuscitation drugs may be given IV by bolus injection into a peripheral vein, followed by an injection of 20 ml IV fluid; elevate the extremity for 10–20 sec to facilitate drug delivery to the central circulation

Continuous IV INF route

• Dilute 1 mg EPINEPHrine in 250 or 500 ml of a compatible IV inf sol to provide a concentration of 4 or 2 mcg/ml, respectively; give into a large vein, if possible. More-concentrated sols (16–32 mcg/ml) may be used in fluid-restricted patients when administered through a central line

Y-site compatibilities: Alfentanil, amikacin, amiodarone, amphotericin B liposome, anidulafungin, ascorbic acid, atracurium, atropine, aztreonam, benztropine, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, caspofungin, ceFAZolin, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, cefTAZidime, ceftizoxime, cefTRIAXone, cefuroxime, chloramphenicol, chlorproMAZINE, cimetidine, cisatracurium, CISplatin, clindamycin, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, dexmedetomidine, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, DOXOrubicin, doxycycline, enalaprilat, epirubicin, epoetin alfa, ertapenem, erythromycin, esmolol, etoposide, etoposide phosphate, famotidine, fenoldopam, fentaNYL, fluconazole, fludarabine, folic acid, furosemide, gemcitabine, gentamicin, glycopyrrolate, granisetron, heparin,

hydrocortisone, HYDROmorphone, ifosfamide, imipenem-cilastatin, isoproterenol, ketorolac, labetalol, levofloxacin, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, meperidine, metaraminol, methicillin, methotrexate, methoxamine, methyldopa, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, midazolam, milrinone, minocycline, mitoXANtrone, morphine, multiple vitamins, nafcillin, nalbuphine, naloxone, niCARdipine, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxacillin, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pancuronium, pantoprazole, PEMEtrexed, penicillin G potassium, pentamidine, pentazocine, phentolamine, phenylephrine, phytonadione, piperacillin/tazobactam, potassium chloride, procainamide, prochlorperazine, promethazine, propofol, propranolol, protamine, pyridoxine, quinupristin/dalfopristin, ranitidine, remifentanil, ritodrine, rocuronium, sodium acetate, streptomycin, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiamine, thiotepa, ticarcillin/clavulanate, tigecycline, tirofiban, tobramycin, tolazoline, trimethaphan, urokinase, vancomycin, vasopressin, vecuronium, verapamil, vinCRIStine, vinorelbine, vitamin B complex with C, voriconazole, warfarin, zoledronic acid

SIDE EFFECTS

CNS: *Tremors, anxiety,* insomnia, headache, *dizziness,* confusion, hallucinations, cerebral hemorrhage, weakness, drowsiness
CV: *Palpitations, tachycardia,* hypertension, dysrhythmias, increased T wave
GI: *Anorexia, nausea, vomiting*
MISC: Sweating, dry eyes
RESP: *Dyspnea*

PHARMACOKINETICS

Crosses placenta, metabolized in liver
IM: Onset variable, duration 1-4 hr
SUBCUT: Onset 5-15 min, duration 20 min-4 hr
INH: Onset 1-5 min, duration 1-3 hr

INTERACTIONS

- Do not use with MAOIs or tricyclics; hypertensive crisis may occur
- Toxicity: other sympathomimetics

Decrease: hypertensive effects—β-adrenergic blockers

Drug/Herb

- Increased stimulation: coffee, tea, guarana, yerba maté

NURSING CONSIDERATIONS

Assess:

- **Asthma:** auscultate lungs, pulse, B/P, respirations, sputum (color, character); monitor pulmonary function studies before and during treatment
- **ECG** during administration continuously; if B/P increases, decrease dose; B/P, pulse q5min after parenteral route; CVP, ISVR, PCWP during inf if possible; inadvertent high arterial B/P can result in angina, aortic rupture, cerebral hemorrhage
- Inj site: tissue sloughing; administer phentolamine with NS
- **Sulfite sensitivity;** may be life-threatening
- Cardiac status, I&O; blood glucose in diabetes
- **Allergic reactions, bronchospasms:** withhold dose, notify prescriber

Perform/provide:

- Storage of reconstituted sol refrigerated ≤24 hr
- Do not use discolored sol

Evaluate:

- Therapeutic response: increased B/P with stabilization or ease of breathing

Teach patient/family:

- About the reason for product administration; how to administer
- To rinse mouth after use to prevent dryness after inhalation
- Not to take OTC preparations

TREATMENT OF OVERDOSE:

Administer α-blocker and β-blocker

EPINEPHrine/ epinephryl borate ophthalmic

See Appendix B

EPINEPHrine nasal agent

See Appendix B

⚠ HIGH ALERT

epirubicin (Rx)

(ep-ih-roo'bi-sin)

Ellence, Pharmorubicin ✦

Func. class.: Antineoplastic, antibiotic

Chem. class.: Anthracycline

Do not confuse:

DOXOrubicin DAUNOrubicin, eribulin, IDArubicin

epirubicin/eribulin

ACTION: Inhibits DNA synthesis primarily; replication is decreased by binding to DNA, which causes strand splitting; maximum cytotoxic effects at S and for G_2 phases; a vesicant

USES: Adjuvant therapy for breast cancer with axillary node involvement after resection

Unlabeled uses: Used in combination for treatment of advanced forms of cancer: bladder, gastric, head and neck, hepatocellular, lung, ovarian, multiple myeloma, soft-tissue sarcoma

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, hypersensitivity to product, anthracyclines, anthracenediones, baseline neutrophil count <1500 cell/mm^3, severe myocardial insufficiency, recent MI

Black Box Warning: Severe hepatic disease, IM/SUBCUT use

Precautions: Children, geriatric patients, cardiac/renal/hepatic disease, accidental exposure, angina, dental disease, herpes, hyperkalemia, hyperphosphatemia, hypertension, hyperuricemia, hypocalcemia, infection, infertility, tumor lysis syndrome, ventricular dysfunction, previous anthracycline use

Black Box Warning: Bone marrow depression (severe), heart failure, extravasation, secondary malignancy, requires an experienced clinician

DOSAGE AND ROUTES

Breast cancer with axillary node involvement following resection of the primary tumor in combination with cyclophosphamide and fluorouracil

- **Adult: IV** 100 mg/m^2 on day 1 with fluorouracil and cyclophosphamide (FEC regimen) every 21 days × 6 cycles or 60 mg/m^2 on days 1 and 8 with oral cyclophosphamide and fluorouracil every 28 days × 6 cycles.

Breast cancer in combination with cyclophosphamide

- **Adult: IV** 60 mg/m^2 day 1 with cyclophosphamide (500 mg/m^2 IV day 1), repeated every 21 days × 8 cycles or a higher-dose regimen of epirubicin 100 mg/m^2 IV day 1 with cyclophosphamide (830 mg/m^2 IV day 1), every 21 days × 8 cycles

Dosage adjustments based upon hematologic and non-hematologic toxicities

- **Nadir platelet counts <50,000/mm^3, absolute neutrophil counts (ANC) <250/mm^3, neutropenic fever, or grades 3/4 non-hematologic toxicities:** Day 1 dose in subsequent cycles should be reduced by 25% of the previous dose
- **For patients receiving divided-dose epirubicin (i.e., day 1 and 8):** Day 8 dose should be reduced by 25% of the day 1 dose if the platelet counts are 75,000–100,000/mm^3 and the ANC is

1000–1499/mm³; if day 8 platelet counts are <75,000/mm³, ANC <1000/mm³, or grade 3/4 non-hematologic toxicity has occurred, omit the day 8 dose

Hepatic dose

• **Adult: IV** Bilirubin 1.2-3 mg/dl or AST 2-4× normal upper limit, 50% of starting dose; bilirubin >3-5 mg/dl or AST >4× normal upper limit, 25% of starting dose

Available forms: Inj (2 mg/ml) 10 mg/5 ml, 50 mg/25 ml, 150 mg/75 ml, 200 mg/100 ml

Administer:

• Antiemetic 30-60 min before product to prevent vomiting

• Allopurinol or sodium bicarbonate to maintain uric acid levels, alkalinization of urine, monitor electrolytes

Black Box Warning: To be used by a clinician experienced in giving cytotoxic products

Black Box Warning: Do not use IM/SUBCUT because of severe tissue necrosis

• Give IV, do not give IM, subcut; a vesicant; if extravasation occurs stop and complete via another vein, preferably in another limb; avoid infusion into veins over joints or in extremities with compromised venous or lymphatic drainage

• Rapid injection can cause facial flushing or erythema along the vein; avoid administration time of <3 min

• Product should be given to those with neutrophils ≥1500/mm³, platelet count ≥100,000/mm³, and non-hematologic toxicities recovered to ≤grade 1

• When refrigerated, the preservative-free, ready-to-use solution can form a gelled product and will return to solution after 2–4 hr at room temperature

• Visually inspect for particulate matter and discoloration before use

IV route

• Use cytotoxic handling procedures; pregnant women must not handle product

• Reconstitute 50 mg and 200 mg powder for injection vials with 25 ml and 100 ml, respectively, of Sterile Water for Injection (2 mg/ml), shake vigorously for up to 4 min; reconstituted sols are stable for 24 hr when stored refrigerated and protected from light or at room temperature in normal light

• Solution can be further diluted with Sterile Water for Injection

IV INJ route

• Give doses of 100–120 mg/m² into tubing of a freely flowing 0.9% sodium chloride (NS) or D_5W IV inf over 15–20 min; the infusion time may be decreased, proportionally, in those who require lower doses; infusion times <3 min are not recommended

• Direct injection into the vein is not recommended because of the risk of extravasation; avoid use with any solution of alkaline pH because hydrolysis will occur

IV INF route

• Dilute dose in 0.9% sodium chloride (NS) or D_5W, infuse over 30–60 min, avoid use with any solution of alkaline pH because hydrolysis will occur

Y-site compatibilities: Alemtuzumab, alfentanil, amifostine, amikacin, aminocaproic acid, anidulafungin, atracurium, aztreonam, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, caspofungin, ceFAZolin, cefotaxime, ceftizoxime, chlorproMAZINE, cimetidine, ciprofloxacin, cisatracurium, CISplatin, clindamycin, cyclophosphamide, cycloSPORINE, DAPTOmycin, dexrazoxane, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, dolasetron, DOPamine, doxacurium, doxycycline, droperidol, enalaprilat, ePHEDrine, EPINEPHrine, ertapenem, erythromycin, etoposide, famotidine, fenoldopam, fentaNYL, fluconazole, gatifloxacin, gemcitabine, gentamicin, granisetron, haloperidol, hydrocortisone, HYDROmorphone, hydrOXYzine, ifosfamide, imipenem-cilastatin, inamrinone, insulin (regular), isoproterenol, labetalol, levofloxacin, levorphanol, lidocaine, linezolid, LORazepam, mannitol,

meperidine, mesna, methotrexate, metoclopramide, metoprolol, metroNIDAZOLE, midazolam, milrinone, minocycline, mitoMYcin, mivacurium, morphine, nalbuphine, naloxone, nesiritide, niCARdipine, nitroglycerin, nitroprusside, norepinephrine, octreotide, ofloxacin, ondansetron, oxaliplatin, PACLitaxel, palonosetron, pamidronate, pancuronium, pentamidine, pentazocine, phenylephrine, potassium chloride, procainamide, prochlorperazine, promethazine, propranolol, quinupristin-dalfopristin, ranitidine, remifentanil, rocuronium, sodium acetate, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiotepa, tigecycline, tirofiban, tobramycin, trimethobenzamide, vancomycin, vasopressin, vecuronium, verapamil, vinBLAStine, vinCRIStine, vinorelbine, voriconazole, zidovudine, zoledronic acid

SIDE EFFECTS

CV: Increased B/P, sinus tachycardia, PVCs, chest pain, bradycardia, extrasystoles, cardiomyopathy
GI: *Nausea, vomiting, anorexia, mucositis, diarrhea*
GU: *Amenorrhea, hot flashes, hyperuricemia*
HEMA: Thrombocytopenia, leukopenia, anemia, neutropenia, secondary AML
INTEG: *Rash,* necrosis, *pain at inj site, reversible alopecia*
MISC: *Infection, febrile neutropenia, lethargy, fever, conjunctivitis,* tumor lysis syndrome

PHARMACOKINETICS

Triphasic pattern of elimination; half-life 3 min, 2.5 hr, 33 hr; metabolized by liver; crosses placenta; excreted in urine, bile, breast milk

INTERACTIONS

• Give epirubicin before PACLitaxel if both are given
Increase: toxicity—other antineoplastics or radiation, cimetidine
Increase: ventricular dysfunction, CHF—trastuzumab
Increased: heart failure—calcium channel blockers
Decrease: antibody response—live virus vaccine

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Bone marrow depression (severe): CBC, differential, platelet count weekly; withhold product if baseline neutrophil $\leq 1500/mm^3$; leukocyte nadir occurs 10-14 days after administration, recovery by day 21; notify prescriber of results

• **Infection:** treat before receiving this product if regimens >120 mg/m^2, prophylactic antibiotics should be given (trimethaprin-sulfamethoxazole or a quinolone)
• Blood, urine uric acid levels; swelling, joint pain primarily in extremities; patient should be well hydrated to prevent urate deposits
• Renal disease: BUN, serum uric acid, urine CCr, electrolytes before, during therapy; I&O ratio; report fall in urine output to <30 ml/hr; dosage adjustment needed if serum creatinine >5 mg/dl
• Increased fluid intake to 2-3 L/day to prevent urate, calculi formation

Black Box Warning: Hepatic studies before, during therapy: bilirubin, AST, ALT, alk phos as needed or monthly

Black Box Warning: Heart failure: B/P, pulse, character, rhythm, rate, ABGs, ECG, LVEF, MUGA scan, or ECHO; watch for ST-T wave changes, low QRS and T, possible dysrhythmias (sinus tachycardia, heart block, PVCs); identify cumulative amount of anthracycline received (lifetime)

• Bleeding: hematuria, guaiac, bruising, or petechiae, mucosa or orifices q8hr
• Effects of alopecia on body image; discuss feelings about body changes

Black Box Warning: Extravasation (vesicant): local irritation, pain, burning, necrosis at inj site, discontinue and start at another site

• GI symptoms: frequency of stools, cramping

Evaluate:

• Therapeutic response: decreased tumor size, spread of malignancy

Teach patient/family:

• That hair may be lost during treatment; that wig or hairpiece may make patient feel better; that new hair may be different in color, texture; new hair growth occurs in ≤3 mo after treatment

• To avoid crowds, persons with infections when granulocyte count is low

• That contraceptive measures recommended during therapy and for 4 mo thereafter for men and women; pregnancy (D)

• To avoid vaccinations because reactions may occur; to avoid cimetidine during therapy

• That urine may appear red for 2 days

• To avoid OTC medications, supplements unless approved by prescriber

Black Box Warning: That irreversible myocardial damage, leukopenia, menopause may occur

• To report rapid heart beat, trouble breathing, fever, nausea, vomiting, oral sores

eplerenone (Rx)

(ep-ler-ee'known)

Inspra

Func. class.: Antihypertensive

Chem. class.: Selective aldosterone receptor antagonist

ACTION: Binds to mineralocorticoid receptor and blocks the binding of aldosterone, a component of the renin-angiotensin-aldosterone system (RAAS)

USES: Hypertension, alone or in combination with thiazide diuretics, CHF, post-MI

CONTRAINDICATIONS: Hypersensitivity; increased serum creatinine >2 mg/dl (male), >1.8 mg/dl (female); potassium >5.5 mEq/L, type 2 diabetes with microalbuminuria, hepatic disease, CCr <30 ml/min; CCr <50 ml/min in hypertension

Precautions: Pregnancy (B), breastfeeding, child, geriatric patients, impaired renal/hepatic function, hyperkalemia

DOSAGE AND ROUTES

• **Adult: PO** 50 mg/day initially, may increase to 50 mg bid after 4 wk; start dose at 25 mg/day if patient is taking CYP3A4 inhibitors

CHF or post-MI

• **Adult: PO** 25 mg/day initially, may increase to 50 mg/day max after 4 wk

Available forms: Tabs 25, 50 mg

Administer:

• Without regard to food

• Do not use salt substitutes containing potassium

SIDE EFFECTS

CNS: Headache, dizziness, fatigue

CV: Angina, MI

GI: Increased GGT diarrhea, abdominal pain, increased ALT

GU: Gynecomastia, mastodynia (males), abnormal vaginal bleeding

META: Hyperkalemia, hyponatremia, hypercholesteremia, hypertriglyceridemia, increased uric acid

RESP: Cough

PHARMACOKINETICS

Peak 1½ hr; serum protein binding 50%; half-life 4-6 hr; metabolized in liver by CYP3A4 inhibitor; excreted in urine, feces

INTERACTIONS

Increase: hyperkalemia—ACE inhibitors, angiotensin II antagonists, NSAIDs, potassium supplements, potassium-sparing diuretics
Increase: serum levels of lithium
Increase: levels of eplerenone—CYP3A4 inhibitors (ketoconazole, itraconazole, saquinavir, erythromycin, verapamil, fluconazole); reduce dose of eplerenone
Decrease: antihypertensive effect—NSAIDs

Drug/Herb
Decrease: antihypertensive effect—ephedra

Drug/Food
- Grapefruit, grapefruit juice increase product level by 25%
- Do not use salt substitutes containing potassium

Drug/Lab Test
Increase: BUN, creatinine, potassium, cholesterol, lipids, uric acid
Decrease: sodium

NURSING CONSIDERATIONS

Assess:
- **Hypertension:** B/P at peak/trough level of product, orthostatic hypotension, syncope when used with diuretic; monitor lithium level in those also taking lithium
- Renal studies: protein, BUN, creatinine; increased LFTs, uric acid may be increased
- Potassium levels, hyperkalemia may occur

Perform/provide:
- Storage in tight container at ≤86° F (30° C)

Evaluate:
- Therapeutic response: decreased B/P

Teach patient/family:
- Not to discontinue product abruptly
- Not to use OTC products (cough, cold, allergy) unless directed by prescriber; not to use salt substitutes containing potassium without consulting prescriber
- To comply with dosage schedule, even if feeling better
- That product may cause dizziness, fainting, lightheadedness; may occur during first few days of therapy
- How to take B/P; and about normal readings for age group

epoetin alfa (Rx)

(ee-poe'e-tin)

Epogen, Eprex ♣, Procrit

Func. class.: Antianemic, biologic modifier, hormone

Chem. class.: Amino acid polypeptide

ACTION: Erythropoietin is 1 factor controlling the rate of red cell production; product is developed by recombinant DNA technology

USES: Anemia caused by reduced endogenous erythropoietin production, primarily end-stage renal disease; to correct hemostatic defect in uremia; anemia due to AZT treatment in patients with HIV or those receiving chemotherapy; reduction of allogenic blood transfusion in surgery patients
Unlabeled uses: Anemia in premature preterm infants, anemia due to ribavirin and interferon-alfa therapy in hepatitic C

CONTRAINDICATIONS: Hypersensitivity to mammalian-cell–derived products, human albumin; uncontrolled hypertension
Precautions: Pregnancy (C), breastfeeding, children <1 mo, seizure disorder; multidose preserved formulation contains benzyl alcohol and should not be used in premature infants; porphyria, CV disease, hemodialysis, latex allergy, hypertension, history of CABG

Black Box Warning: Hgb >12 g/dl, surgery, neoplastic disease

DOSAGE AND ROUTES

Anemia (chronic kidney disease including dialysis-dependent and dialysis-independent patients to decrease the need for red blood cell transfusion)

• **Adult/adolescent ≥17 yr: SUBCUT/IV** Initially, 50–100 units/kg 3×/wk; for patients on dialysis, administer IV. For patients on dialysis, initiate treatment when hemoglobin (Hgb) is <10 g/dl. If Hgb approaches or exceeds 11 g/dl, reduce or interrupt the dose. For patients not on dialysis, consider initiating treatment only when Hgb is <10 g/dl and the rate of Hgb decline indicates the likelihood of requiring RBC transfusion and reducing the risk of alloimmunization and/or other RBC transfusion–related risks is a goal. If Hgb is >10 g/dl, reduce or interrupt the dose, and use the lowest dose sufficient to reduce the need for RBC transfusions. If the Hgb rises >1 g/dl in any 2-week period, reduce dose by 25% or more as needed to reduce rapid responses. In contrast, if Hgb has not increased >1 g/dl after 4 wk of therapy, increase the dose by 25%. For patients who do not respond adequately over a 12-wk escalation period, increasing the dose further is unlikely to improve response and can increase risks. Use the lowest dose that will maintain a Hgb concentration sufficient to reduce the need for RBC transfusions. Evaluate other causes of anemia, and discontinue if responsiveness does not improve

• **Infant/child/adolescent ≤16 yr: SUBCUT/IV** 50 units/kg 3×/wk initially. For dosage adjustments, see adult dosage.

Zidovudine-induced anemia in HIV-infected patients with circulating endogenous erythropoietin concentrations ≤500 mUnits/ml who are receiving a dose of zidovudine ≤4200 mg/week

• **Adult: SUBCUT/IV** Initially, 100 units/kg 3×/wk. If Hgb does not increase after 8 wk, increase by 50–100 units/kg at 4-8-wk intervals until Hgb is at a concentration to avoid RBC transfusions or a dose of 300 units/kg is reached. If the Hgb is >12 g/dl, withhold, once Hgb is <11 g/dl resume at a dose 25% below the previous dose

Anemia (non-myeloid malignancies where the anemia is due to the effect of concomitantly administered chemotherapy and at least 2 additional months of chemotherapy is planned)

• **Adult: SUBCUT** 150 units/kg 3×/wk or 40,000 units 1×/wk only when the hemoglobin is <10 g/dl and only until the chemotherapy course is completed. Adjust the dosage to maintain the lowest Hgb concentration sufficient to avoid RBC transfusions. If no rise in Hgb ≥1 g/dl after 4 wk of therapy and Hgb is <10 g/dl, the dosage may be increased to 300 units/kg subcut 3×/wk or 60,000 units 1×/wk. Discontinue if after 8 wk of therapy there is no response as measured by Hgb concentrations or if transfusions are still required. Reduce the dosage by approximately 25% if Hgb increases by >1 g/dl in any 2-wk period or if Hgb reaches a concentration needed to avoid RBC infusion. If Hgb is increasing and exceeds a concentration necessary to avoid blood transfusions, hold therapy and reinstitute at a dose that is 25% lower when the Hgb reaches a concentration where transfusions may be needed

• **Adolescent/child ≥5 yr: IV** 600 units/kg/wk only when the hemoglobin is <10 g/dl and only until the chemotherapy course is completed. Adjust the dosage to maintain the lowest Hgb concentration sufficient to avoid RBC transfusions. If no rise in Hgb ≥1 g/dl after 4 wk of therapy and Hgb is <10 g/dl, the dosage may be increased to 900 units/kg (up to 60,000 units)/wk IV. Discontinue if after 8 wk there is no response as measured by Hgb concentrations or if transfusions are still required. Reduce the dosage by approximately 25% if Hgb increases by more than 1 g/dl in any 2-wk period or if Hgb reaches a concentration needed to avoid

E

RBC infusion. If the Hgb is increasing and exceeds a concentration necessary to avoid blood transfusions, hold therapy and reinstitute at a dose that is 25% lower when the Hgb reaches a concentration where transfusions may be needed

To reduce the need for allogenic blood transfusions in anemic patients (hemoglobin >10 and ≤13 g/dl) scheduled to undergo elective, noncardiac, nonvascular surgery

• **Adult: SUBCUT** 300 units/kg/day × 10 days before surgery, on the day of surgery, and for 4 days after surgery (14 days total) or 600 units/kg 1×/wk, 21, 14, and 7 days before surgery plus 1 dose on the day of surgery

Available forms: Inj 2000, 3000, 4000, 10,000, 20,000, 40,000 units/ml

Administer:

• Do not shake vial

• Use 1 single-use vial/dose, once syringe has entered single dose vial, sterility cannot be guaranteed, do not administer with other product, multidose vials can be stored in refrigerator up to 21 days once opened

SUBCUT route

• Before injecting preservative free-, single-dose formulation may be admixed using 0.9% NaCl with benzyl alcohol 0.9% at a 1:1 ratio to reduce inj site discomfort

Direct IV route

• Additional heparin to lower chance of clots

• By direct inj or bolus into IV tubing or venous line at end of dialysis

• Decrease dose by 25 units/kg if Hct increases by 4% in 2 wk; increase dose if Hct does not increase by 5-6 pts after 8 wk of therapy; suggested target Hct range 30%–36%

Solution compatibilities: Do not dilute or administer with other sol

SIDE EFFECTS

CNS: Seizures, coldness, sweating, headache

CV: *Hypertension,* hypertensive encephalopathy, CHF, edema, DVT

INTEG: Pruritus, rash, inj site reaction

MISC: Iron deficiency

MS: Bone pain

RESP: Cough

PHARMACOKINETICS

IV: Metabolized in body, extent of metabolism unknown, onset of increased reticulocyte count 2-6 wk, peak immediate

INTERACTIONS

• Need for increased heparin during hemodialysis

NURSING CONSIDERATIONS

Assess:

• Renal studies: urinalysis, protein, blood, BUN, creatinine; I&O, report drop in output <50 ml/hr

Black Box Warning: Blood studies: ferritin, transferrin, serum iron monthly; transferrin sat ≥20%, ferritin ≥100 ng/ml; Hct 2×/wk until stabilized in target range (30%-36%) then at regular intervals; those with endogenous erythropoietin levels of <500 units/L respond to product; monitor Hct 2×/wk with chronic renal failure; patients treated with zidovudine or patients with cancer should be monitored weekly then periodically after stabilization; death may occur with Hgb >12 g/dl

• B/P; check for rising B/P as Hct rises, antihypertensives may be needed; hypertension may occur rapidly, leading to hypertensive encephalopathy

• CNS symptoms: coldness, sweating, pain in long bones; for seizures if Hct is increased within 2 wk by 4 pts

• Hypersensitivity reactions: skin rashes, urticaria (rare), antibody development does not occur

⚠ **Pure cell aplasia (PRCA)** in absence of other causes; evaluate by testing sera for recombinant erythropoetin antibodies; any loss of response to epoetin should be evaluated

• Dialysis patients: thrill, bruit of shunts; monitor for circulation impairment

• **Seizures:** place patient on seizure precautions if increase of ≥4 points HCT in 2 wk, increased B/P; more common in chronic renal failure during the first 90 days of treatment

Evaluate:

• Therapeutic response: increase in reticulocyte count in 2-6 wk, Hgb/Hct; increased appetite, enhanced sense of well-being

Teach patient/family:

• To avoid driving or hazardous activities during beginning of treatment

• To monitor B/P

• To take iron supplements, vit B_{12}, folic acid as directed

eprosartan (Rx)

(ep-roh-sar'tan)

Teveten

Func. class.: Antihypertensive

Chem. class.: Angiotensin II–receptor antagonist (Subtype AT_1)

ACTION: Blocks the vasoconstrictive and aldosterone-secreting effects of angiotensin II; selectively blocks the binding of angiotensin II to the AT_1 receptor found in tissues

USES: Hypertension, alone or with other antihypertensives

CONTRAINDICATIONS: Hypersensitivity

Black Box Warning: Pregnancy (D) 2nd/3rd trimesters

Precautions: Pregnancy (C) 1st trimester, breastfeeding, children, geriatric patients, hypersensitivity to ACE inhibitors; renal/hepatic disease, angioedema

DOSAGE AND ROUTES

• **Adult: PO** 600 mg/day; dose may be divided, given bid, with total daily doses from 400-800 mg, max 900 mg/day

Available forms: Tabs 400, 600 mg

Administer:

• Without regard to meals

SIDE EFFECTS

CNS: *Dizziness,* depression, fatigue, headache

CV: Chest pain, hypotension

EENT: Sinusitis

GI: *Diarrbea, dyspepsia,* abdominal pain

GU: UTI

INTEG: Pruritus, angioedema

META: Hypertriglyceridemia

MS: Myalgia, arthralgia, rhabdomyolysis

RESP: *Cough, upper respiratory infection,* rhinitis, pharyngitis, viral infection

SYST: Anaphylaxis

PHARMACOKINETICS

Peak 1-2 hr, food delays absorption; protein binding 98%; moderate renal impairment increases product levels by 30%, hepatic impairment increases levels by 40%; excreted in urine and feces; half-life 5-9 hr

INTERACTIONS

Decrease: antihypertensive effect—NSAIDs, salicylates

Drug/Lab Test

Increase: ALT, AST, alk phos

Decrease: Hgb

NURSING CONSIDERATIONS

Assess:

• B/P with position changes, pulse q4hr; note rate, rhythm, quality

⚠ Hypersensitivity reactions, including anaphylaxis

⚠ Myalgia, arthralgia; may cause rhabdomyolysis

• Baselines of renal, hepatic studies before therapy begins

• Edema in feet, legs daily

• Skin turgor, dryness of mucous membranes for hydration status

Evaluate:

• Therapeutic response: decreased B/P

Teach patient/family:

• To comply with dosage schedule, even if feeling better

• To notify prescriber of fever; chest pain; swelling of hands, feet, face, lip, or tongue

• That excessive perspiration, dehydration, diarrhea may lead to fall in B/P; consult prescriber if these occur

• That product may cause dizziness; to avoid hazardous activities until effect is known

Black Box Warning: Not to take this product if pregnant or breastfeeding, or if have had an allergic reaction to product

• To take missed dose as soon as possible unless within 1 hr before next dose

• That therapeutic effect may take 2-3 wk

⚠ HIGH ALERT

eptifibatide (Rx)

(ep-tih-fib'ah-tide)

Integrilin

Func. class.: Antiplatelet agent

Chem. class.: Glycoprotein IIb/IIIa inhibitor

ACTION: Platelet glycoprotein antagonist; this agent reversibly prevents fibrinogen, von Willebrand's factor from binding to the glycoprotein IIb/IIIa receptor, thus inhibiting platelet aggregation

USES: Acute coronary syndrome including those undergoing percutaneous coronary intervention (PCI)

CONTRAINDICATIONS: Hypersensitivity, active internal bleeding; history of bleeding, stroke within 2 yr; major surgery with severe trauma, severe hypertension, history of intracranial bleeding, current or planned use of another parenteral GP IIb/IIIa inhibitor, dependence on renal dialysis, coagulopathy, AV malformation, aneurysm

Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, bleeding, impaired renal function

DOSAGE AND ROUTES

Acute coronary syndrome

• **Adult: IV BOL** 180 mcg/kg as soon as diagnosed, max 22.6 mg, then **IV CONT** 2 mcg/kg/min until discharge or CABG up to 72 hr, max 15 mg/hr

PCI in patients without acute coronary syndrome

• **Adult: IV BOL** 180 mcg/kg given immediately before PCI then 2 mcg/kg/min × 18 hr CONT IV INF and a second 180-mcg/kg bolus by 10 min after 1st bolus; continue inf for up to 18-24 hr at rate of 1 mcg/kg/min

Renal dose

• **Adult: IV** maintenance CCr <50 ml/min, 1 micro mcg/kg/min, max rate 7.5 mg/hr; CCr <10 ml/min, contraindicated

Available forms: Sol for inj 2 mg/ml (10 ml), 0.75 mg/ml (100 ml)

Administer:

• Aspirin and heparin may be given with this product; check for bleeding

• D/C heparin before removing femoral artery sheath, after PCI

Direct IV route

• After withdrawing bolus dose from 10-ml vial, give IV push over 1-2 min

Continuous IV INF route

• Follow bolus dose with continuous inf using pump; give product undiluted directly from 100-ml vial, spike 100-ml vial with vented inf set, use caution when centering spike on circle of stopper top

Y-site compatibilities: Alfentanil, alteplase, amikacin, aminophylline, amphotericin B lipid complex, amphotericin B liposome, ampicillin, ampicillin-sulbactam, anidulafungin, argatroban, atenolol, atracurium, atropine, azithromycin, aztreonam, bivalirudin, bumetanide, buprenorphine, butorpha-

nol, calcium chloride/gluconate, ceFAZolin, cefepime, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, cefTAZidime, cefTRIAXone, cefuroxime, cimetidine, ciprofloxacin, cisatracurium, clindamycin, cycloSPORINE, DAPTOmycin, dexamethasone, D_5/NaCl 0.9%, diazepam, diltiazem, diphenhydrAMINE, DOBUTamine, dolasetron, DOPamine, doxycycline, droperidol, enalaprilat, ePHEDrine, EPINEPHrine, ertapenem, erythromycin, esmolol, famotidine, fentaNYL, fluconazole, fosphenytoin, ganciclovir, gatifloxacin, gentamicin, granisetron, haloperidol, heparin, hydrocortisone, HYDROmorphone, hydrOXYzine, imipenem-cilastatin, inamrinone, isoproterenol, ketorolac, labetalol, leucovorin, levofloxacin, levorphanol, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, meperidine, meropenem, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, micafungin, midazolam, milrinone, minocycline, mivacurium, morphine, nalbuphine, naloxone, niCARdipine, nitroglycerin, nitroprusside, NS, octreotide, ofloxacin, ondansetron, oxytocin, palonosetron, pancuronium, PEMEtrexed, PENTobarbital, PHENobarbital, phenylephrine, piperacillin, piperacillin-tazobactam, potassium chloride/phosphates, procainamide, prochlorperazine, promethazine, propranolol, ranitidine, remifentanil, rocuronium, sodium bicarbonate/phosphates, succinylcholine, SUFentanil, sulfamethoxazole-trimethoprim, teniposide, theophylline, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, tobramycin, trimethobenzamide, vancomycin, vecuronium, verapamil, zidovudine, zoledronic acid

Solution compatibilities: 0.9% NaCl, D_5/0.9% NaCl

SIDE EFFECTS

CV: Stroke, hypotension
GU: Hematuria
HEMA: Thrombocytopenia
SYST: Bleeding, anaphylaxis

PHARMACOKINETICS

Onset within 1 hr, protein binding 25%, half-life 1.5-2 hr, steady state 4-6 hr, metabolism limited, excretion via kidneys

INTERACTIONS

- Do not give with glycoprotein inhibitors IIb, IIIa

Increase: bleeding—aspirin, heparin, NSAIDs, anticoagulants, ticlopidine, clopidogrel, dipyridamole, thrombolytics, valproate, abciximab

Drug/Herb

Increase: Bleeding risk—arnica, chamomile, clove, dong quai, feverfew, garlic, ginger, ginkgo, Panax ginseng

NURSING CONSIDERATIONS

Assess:

⚠ **Thrombocytopenia:** platelets, Hgb, Hct, creatinine, PT/APTT baseline INR within 6 hr of loading dose, daily therafter, patients undergoing PCI should have ACT monitored; maintain APTT 50-70 sec unless PCI to be performed; during PCI, ACT should be 200-300 sec; if platelets drop $<100{,}000/mm^3$, obtain additional platelet counts; if thrombocytopenia is confirmed, discontinue product; draw Hct, Hgb, serum creatinine

⚠ **Bleeding:** gums, bruising, ecchymosis, petechiae; from GI, GU tract, cardiac cath sites, IM inj sites

Perform/provide:

- Do not give discolored solutions, those with particulates; discard unused amount
- Discontinue product prior to CABG
- All medications PO if possible; avoid IM inj, all catheters

Teach patient/family:

- About reason for medication and expected results
- To report bruising, bleeding, chest pain immediately

eribulin

(er'i-bu'lin)

Halaven

Func. class.: Antineoplastics—nontaxane

Do not confuse:
eribulin/epirubicin/erlotinib

ACTION: Potent antimitotic agent, different from taxanes, vinca alkaloids, epothilones; blocks cell progression during G2-M phase; inhibits the growth phase of microtubules and sequesters tubules, leading to the disruption of mitotic spindles and apoptotic cell death

USES: Metastatic breast cancer in patients who have received at least 2 chemotherapy regimens

CONTRAINDICATIONS: Hypersensitivity, pregnancy (D)

Precautions: Breastfeeding, neonates, infants, children, bradycardia, electrolyte imbalances, heart failure, hypokalemia, hypomagnesemia, infertility, neutropenia, peripheral neuropathy, QT prolongation, hepatic/renal disease

DOSAGE AND ROUTES

• **Adult: IV** 1.4 mg/m² over 2-5 min on days 1 and 8, repeat q21days

• **Recommendations for dose delay:** for ANC <1000/mm³, platelets <75,000/mm³, or grade 3 or 4 nonhematologic toxicities: do not administer; the day 8 dose may be delayed a maximum of 1 wk; for the day 8 dose, if toxicities do not resolve to ≤ Grade 2 by day 15: omit the dose; for the day 8 dose, if toxicities resolve or improve to ≤ Grade 2 by day 15: administer eribulin at reduced dose (see below), initiate the next cycle no sooner than 2 wk later

• **Dose adjustments for hematologic toxicity:** ANC <500/mm³ for >7 days or ANC <1000/mm³ with fever or infection: permanently reduce dose to 1.1 mg/m²; platelets <25,000/mm³ or <50,000/mm requiring transfusion: permanently reduce dose to 1.1 mg/m²; if day 8 of previous cycle omitted or delayed: permanently reduce dose to 1.1 mg/m²; while receiving 1.1 mg/m², if recurrence of hematologic event occurs, or if day 8 of previous cycle omitted or delayed: permanently reduce dose to 0.7 mg/m²; while receiving 0.7 mg/m², if recurrence of hematologic event occurs, or if day 8 of previous cycle omitted or delayed: discontinue

• **Dose adjustments of eribulin for nonhematologic toxicity during treatment:** any Grade 3 or 4 nonhematologic toxicity: permanently reduce dose to 1.1 mg/m²; if day 8 of previous cycle omitted or delayed: permanently reduce dose to 1.1 mg/m²; while receiving 1.1 mg/m², if recurrence of Grade 3 or 4 nonhematologic toxicity occurs, or if day 8 of previous cycle omitted or delayed: permanently reduce dose to 0.7 mg/m²; while receiving 0.7 mg/m², if recurrence of Grade 3 or 4 nonhematologic toxicity occurs, or if day 8 of previous cycle omitted or delayed: discontinue

Available forms: Sol for inj 1 mg/2 ml

Administer:

IV direct, intermittent route

• Visually inspect for particulate matter, discoloration as solution and container permit; withdraw required amount (0.5 mg/ml) from single-use vial, give undiluted over 2-5 min or diluted in 100 ml 0.9% NaCl and give as intermittent inf; do not give through line with dextrose or any other product

SIDE EFFECTS

CNS: Depression, dizziness, *fatigue*, fever, headache, insomnia, *peripheral neuropathy*

CV: QT prolongation, peripheral edema

GI: Abdominal pain, anorexia, constipation, diarrhea, dyspepsia, nausea, vomiting, weight loss

HEMA: Anemia, neutropenia, thrombocytopenia

INTEG: *Alopecia,* rash, stomatitis
META: Hypokalemia
MS: Arthralgia, myalgia, bone/back pain
RESP: Cough, dyspnea
SYST: Infection

PHARMACOKINETICS

Protein binding 49%-65%; inhibits CYP3A4; excreted in feces 82%; urine 9%; elimination half-life 40 hr; increased levels in hepatic/renal disease

INTERACTIONS

Increase: QT prolongation—arsenic trioxide, astemizole, bepridil, chloroquine, certain phenothiazines (chlorproMAZINE, mesoridazine, thioridazine), cisapride, clarithromycin, class IA antiarrhythmics (disopyramide, procainamide, quiNIDine), class III antiarrhythmics (amiodarone, bretylium, dofetilide, ibutilide, sotalol), dextromethorphan; quiNIDine, dronedarone, droperidol, erythromycin, halofantrine, haloperidol, levomethadyl, methadone, pentamidine, pimozide, posaconazole, probucol, propafenone, saquinavir, sparfloxacin terfenadine, troleandomycin, and ziprasidone; also to a lesser degree abarelix, alfuzosin, amoxapine, apomorphine, artemether; lumefantrine, asenapine, β-agonists, ofloxacin, cloZAPine, cyclobenzaprine, dasatinib, dolasetron, flecainide, gatifloxacin, gemifloxacin, halogenated anesthetics, iloperidone, lapatinib, levofloxacin, local anesthetics, lopinavir; ritonavir, magnesium sulfate; potassium sulfate; sodium sulfate, maprotiline, mefloquine, moxifloxacin, nilotinib, norfloxacin, octreotide, ciprofloxacin, OLANZapine, ondansetron, paliperidone, palonosetron, some phenothiazines (fluPHENAZine, perphenazine, prochlorperazine, trifluoperazine), QUEtiapine, ranolazine, risperiDONE, sertindole, SUNItinib, tacrolimus, telavancin, telithromycin, tetrabenazine, tricyclic antidepressants, venlafaxine, vardenafil, vorinostat

NURSING CONSIDERATIONS

Assess:
- Peripheral neuropathy: pain, numbness in extremities
- Infection: increased temperature, sore throat, flulike symptoms
- **QT prolongation:** assess for drug interactions that may occur; monitor ECG, heart rate
- **Bone marrow depression:** CBC, differential, serum creatinine, BUN, electrolytes, LFTs at baseline, periodically; increased AST/ALT >3 × ULN or total bilirubin >1.5 × ULN involve greater chance of Grade 4 or febrile neutropenia

Perform/provide:
- Storage at room temp for 4 hr or 24 hr refrigerated

Teach patient/family:
- **Infection:** to notify prescriber of increased temperature, sore throat, fatigue, flulike symptoms
- **QT prolongation:** to report extra heart beats
- **Peripheral neuropathy:** to report tingling, pain in extremities
- About reason for product and expected results
- To avoid other medications, supplements unless approved by provider; serious drug interactions may occur
- About hair loss, use of wig or hairpiece
- To notify prescriber if pregnancy is planned or suspected (pregnancy [D]), to avoid breastfeeding

erlotinib (Rx)

(er-loe'tye-nib)

Tarceva

Func. class.: Antineoplastic—miscellaneous

Chem. class.: Epidermal growth factor receptor inhibitor

ACTION: Not fully understood; inhibits intracellular phosphorylation of cell-surface receptors associated with epidermal growth factor receptors

USES: Non–small-cell lung cancer (NSCLC), pancreatic cancer
Unlabeled uses: Squamous cell head and neck cancer

CONTRAINDICATIONS: Pregnancy (D), breastfeeding
Precautions: Children, geriatric patients, ocular/pulmonary/renal/hepatic disorders, bradycardia, heart failure, hypokalemia, infertility, QT prolongation

DOSAGE AND ROUTES

Non–small-cell lung cancer (NSCLC)
• **Adult: PO** 150 mg/day
Pancreatic cancer
• **Adult: PO** 100 mg/day in combination with gemcitabine 1000 mg/m^2 cycle 1, days 1, 8, 15, 22, 29, 36, 43 of 8-wk cycle; cycle 2 and subsequent cycle, days 1, 8, 15 of 4-wk cycle
CYP3A4 inducers concurrently (e.g., rifampin, phenytoin)
• Dosage increase is advised
CYP3A4 inhibitors (atazanavir, clarithromycin, indinavir, itraconazole, ketoconazole, telithromycin, ritonavir, saquinavir, troleandomycin, nelfinavir)
• Dosage reduction may be needed
Hepatic dose
• **Adult: PO** interrupt if total bilirubin >3 times ULN and/or transaminases >5 times ULN
Head or neck cancer (unlabeled)
• **Adult: PO** 150 mg daily
Available forms: Tabs 25, 100, 150 mg
Administer:
• 1 hr before or 2 hr after food; at same time of day

SIDE EFFECTS

CNS: CVA, anxiety, depression, headache, rigors
CV: MI/ischemia
EENT: Ocular changes, *conjunctivitis, eye pain*
GI: *Nausea, diarrhea, vomiting, anorexia, mouth ulceration,* hepatic failure, GI perforation
GU: Renal impairment/failure
HEMA: Deep vein thrombosis
INTEG: *Rash,* Stevens-Johnson–like skin reaction, toxic epidermal necrolysis
MISC: *Fatigue, infection*
RESP: Interstitial lung disease, *cough, dyspnea,* ARDS, pulmonary fibrosis
SYST: Hepatorenal syndrome

PHARMACOKINETICS

Slowly absorbed (60%); peak 3-7 hr; excreted in feces (86%), urine (<4%); metabolized by CYP3A4; terminal half-life 36 hr; protein binding 93%

INTERACTIONS

Increase: GI bleeding, may be fatal—warfarin
Increase: erlotinib concentrations—CYP3A4 inhibitors (ketoconazole, itraconazole, erythromycin, clarithromycin, telithromycin)
Increase: plasma concentration of warfarin, metoprolol
Increase: myopathy—HMG-CoA reductase inhibitors
Decrease: erlotinib levels—CYP3A4 inducers (phenytoin, rifampin, carBAMazepine, PHENobarbital), proton-pump inhibitors
Drug/Herb
Decrease: erlotinib levels—St. John's wort
Drug/Smoking
Decrease: erlotinib level; dose may need to be increased
Drug/Food
Increase: effect of erlotinib—grapefruit juice

NURSING CONSIDERATIONS

Assess:
• Serious skin toxicities: toxic epidermal necrolysis, Stevens-Johnson syndrome
⚠ **MI/ischemia, CVA** in patients with pancreatic cancer
⚠ **Pulmonary changes:** lung sounds, cough, dyspnea; interstitial lung disease may occur, may be fatal; discontinue therapy if confirmed

• **Ocular changes:** eye irritation, corneal erosion/ulcer, aberrant eyelash growth
• GI symptoms: frequency of stools; if diarrhea is poorly tolerated, therapy may be discontinued for ≤14 days, monitor for dehydration, fluid status during period of vomiting and diarrhea
• Blood studies: INR, LFTs, PT
• **Hepatic failure:** interrupt dosing if severe changes to liver function occur (total bilirubin >3× ULN and/or transaminases >5× ULN when normal pretreatment LFTs)
• **GI perforation/bleeding:** some cases have been fatal

Evaluate:
• Therapeutic response: decrease in NSCLC cells, pancreatic cancer cells

Teach patient/family:
⚠ To report adverse reactions immediately: SOB, severe abdominal pain, persistent diarrhea or vomiting, ocular changes, skin eruptions
• About reason for treatment, expected results
• To use reliable contraception during treatment (pregnancy D); to avoid breastfeeding
• To avoid use with other products, herbs, supplements unless approved by provider
• To avoid smoking, decreases effect of this product

ertapenem (Rx)

(er-tah-pen'em)

Invanz

Func. class.: Antiinfective—miscellaneous

Chem. class.: Carbapenem

Do not confuse:
INVanz/AVINza

ACTION: Interferes with cell wall replication of susceptible organisms; osmotically unstable cell wall swells, bursts from osmotic pressure; bactericidal

USES: Adult patients with moderate to severe infections caused by the following organisms: intraabdominal infections—*Escherichia coli, Clostridium clostridioforme, Eubacterium lentum, Peptostreptococcus* sp., *Bacteroides fragilis, Bacteroides distasonis, Bacteroides ovatus, Bacteroides thetaiotaomicron, Bacteroides uniformis;* complicated skin/skin-structure infections—*Staphylococcus aureus* (methicillin-susceptible), *Streptococcus pyogenes, E. coli, Peptostreptococcus* sp.; community-acquired pneumonia—*Streptococcus pneumoniae* (penicillin-susceptible), *Haemophilus influenzae* (β-lactamase–negative), *Moraxella catarrhalis;* complicated UTI—*E. coli, Klebsiella pneumoniae;* acute pelvic infections—*Streptococcus agalactiae, E. coli, B. fragilis, Porphyromonas asaccharolytica, Peptostreptococcus* sp., *Prevotella bivia,* infection proplylaxis prior to elective colorectal surgery

CONTRAINDICATIONS: Hypersensitivity to this product, its components, amide-type local anesthetics (IM only); anaphylactic reactions to β-lactams

Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, GI/renal/hepatic disease

DOSAGE AND ROUTES

Complicated intraabdominal infections
• **Adult/adolescent: IM/IV** 1 g/day × 5-14 days
• **Infant ≥3 mo/child: IM/IV** 15 mg/kg bid (max 1 g/day) × 5-14 days

Complicated skin/skin-structure infections
• **Adult: IM/IV** 1 g/day × 7-14 days
• **Child 3 mo-12 yr: IM/IV** 15 mg/kg bid × 7-14 days

Community-acquired pneumonia
• **Adult: IM/IV** 1 g/day × 10-14 days
• **Child 3 mo-12 yr: IM/IV** 15 mg/kg bid × 10-14 days

Complicated UTI

- **Adult: IM/IV** 1 g/day × 10-14 days
- **Child 3 mo-12 yr: IM/IV** 15 mg/kg bid × 10-14 days

Acute pelvic infections

- **Adult: IM/IV** 1 g/day × 3-10 days
- **Child 3 mo-12 yr: IM/IV** 15 mg/kg bid 3-10 days

Surgical infection prophylaxis (unlabeled)

- **Adult: IV** 1 g as a single dose 1 hr prior to surgical incision

Available form: Powder, lyophilized, 1 g

Administer:

IM route

- Reconstitute the 1 g vial of ertapenem with 3.2 ml of 1% lidocaine HCl injection (without EPINEPHrine) (280 mg/ml), agitate well to form a solution; the IM reconstituted formulation is not for IV use
- IM administration may be used as an alternative to IV administration in the treatment of infections where IM therapy is appropriate; only give via IM injection × 7 days
- **For a 1 g dose:** immediately withdraw the contents of the vial and inject deeply into a large muscle, aspirate before injection to avoid injection into a blood vessel
- **For a dose** <1 g (i.e., for pediatric patients 3 mo–12 yr): immediately withdraw a volume equal to 15 mg/kg (max 1 g/day) and inject deeply into a large muscle, aspirate before injection to avoid injecting into a blood vessel; use the reconstituted IM sol within 1 hr after preparation

IV route

- Visually inspect for particulate matter and discoloration before use, may be colorless to pale yellow; do not mix with other products; dextrose sols are not compatible
- **1 g vial:** For each gram reconstitute with 10 ml of either NS injection, sterile water for injection, or bacteriostatic water for injection to 100 mg/ml, shake
- **1 g dose:** immediately transfer contents of the reconstituted vial to 50 ml of NS injection; for a dose <1 g (pediatric patients 3 mo–12 yr): from the reconstituted vial, immediately withdraw a volume equal to 15 mg/kg of body weight (max 1 g/day) and dilute in NS injection to a concentration of 20 mg/ml or less

IV INF route

- Complete the inf within 6 hr of reconstitution, infuse over 30 min; do not coinfuse with other medications
- The reconstituted IV sol may be stored at room temperature if used within 6 hr, or store under refrigeration for 24 hr and use within 4 hours after removal from refrigeration; do not freeze

Y-site compatibilities: Acyclovir, alfentanil, amifostine, amikacin, aminocaproic acid, aminophylline, amphotericin B lipid complex, amphotericin B liposome, argatroban, arsenic trioxide, atenolol, atracurium, azithromycin, aztreonam, bivalirudin, bleomycin, bumetanide, buprenorphine, busulfan, butorphanol, calcium chloride/gluconate, CARBOplatin, carmustine, chloramphenicol, cimetidine, ciprofloxacin, cisatracurium, CISplatin, cyclophosphamide, cycloSPORINE, cytarabine, dacarbazine, DACTINomycin, DAPTOmycin, dexamethasone, dexmedetomidine, dexrazoxane, digoxin, diltiazem, diphenhydrAMINE, DOCEtaxel, dolasetron, DOPamine, doxacurium, doxycycline, enalaprilat, ePHEDrine, EPINEPHrine, eptifibatide, erythromycin, esmolol, etoposide, famotidine, fenoldopam, fluconazole, fludarabine, fluorouracil, foscarnet, fosphenytoin, furosemide, ganciclovir, gatifloxacin, gemcitabine, gemtuzumab, gentamicin, glycopyrrolate, granisetron, haloperidol, heparin, hydrocortisone, HYDROmorphone, ifosfamide, inamrinone, insulin (regular), irinotecan, isoproterenol, ketorolac, labetalol, leucovorin, levofloxacin, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, melphalan, meperidine, mesna, metaraminol, methotrexate,

methyldopate, methylPREDNISolone, metoclopramide, metroNIDAZOLE, milrinone, mitoMYcin, mivacurium, morphine, moxifloxacin, nalbuphine, naloxone, nesiritide, nitroglycerin, nitroprusside, norepinephrine, octreotide, oxaliplatin, oxytocin, PACLitaxel, pamidronate, pancuronium, pantoprazole, PEMEtrexed, PENTobarbital, PHENobarbital, phentolamine, phenylephrine, polymyxin B, potassium acetate/chloride/phosphates, procainamide, propranolol, ranitidine, remifentanil, rocuronium, sodium acetate/bicarbonate/phosphates, streptozocin, succinylcholine, SUFentanil, sulfamethoxazole-trimethoprim, tacrolimus, teniposide, theophylline, thiotepa, tigecycline, tirofiban, tobramycin, trimethobenzamide, vancomycin, vasopressin, vecuronium, vinBLAStine, vinCRIStine, vinorelbine, voriconazole, zidovudine

SIDE EFFECTS

CNS: Insomnia, seizures, dizziness, *headache*
CV: Tachycardia
GI: *Diarrhea, nausea, vomiting,* pseudomembranous colitis
GU: *Vaginitis*
INTEG: *Rash,* urticaria, *pruritus,* pain at inj site, *infused vein complication, phlebitis/thrombophlebitis,* erythema at inj site
RESP: Dyspnea, cough, pharyngitis, crackles, respiratory distress
SYST: Anaphylaxis

PHARMACOKINETICS

IV: Onset immediate; peak dose dependent; half-life 4 hr; metabolized by liver; excreted in urine, feces, breast milk

INTERACTIONS

Increase: ertapenem levels—probenecid; do not coadminister
Decrease: effect of valproic acid
Drug/Lab Test
Increase: hepatic enzymes

NURSING CONSIDERATIONS

Assess:
- Renal disease: lower dose may be required
- **Pseudomembranous colitis:** bowel pattern daily: if severe diarrhea occurs, product should be discontinued
- For infection: temp, sputum, characteristics of wound before, during, after treatment

⚠ **Allergic reactions, anaphylaxis;** rash, urticaria, pruritus; may occur a few days after therapy begins; sensitivity to carbapenem antibiotics, other β-lactam antibiotics, penicillins

- **Overgrowth of infection:** perineal itching, fever, malaise, redness, pain, swelling, drainage, rash, diarrhea, change in cough or sputum

Evaluate:
- Therapeutic response: negative C&S; absence of signs, symptoms of infection

Teach patient/family:
- To report severe diarrhea (may indicate **pseudomembranous colitis**), CNS side effects
- To report overgrowth of infection: black, furry tongue; vaginal itching; foul-smelling stools
- To avoid breastfeeding; product is excreted in breast milk

TREATMENT OF OVERDOSE:

EPINEPHrine, antihistamines; resuscitate if needed (anaphylaxis)

erythromycin

(e-rith'roe-mye'sin)

Ilotycin, Romycin

Func. class.: Ophthalmic anti-infective

Chem. class.: Macrolide

ACTION: Inhibits protein synthesis, thereby decreasing bacterial replication

USES: Conjunctivitis, eye infections, prevention of ophthalmic neonatorum

CONTRAINDICATIONS:

Hypersensitivity to this product or macrolides

Precautions: Pregnancy (B), breastfeeding

DOSAGE AND ROUTES

Bacterial conjunctivitis

• **Adult/adolescent/child:** Apply 1 cm of ointment directly to the eye up to 6 times a day ×7–10 days depending on severity of infection

Prevention of ophthalmic neonatorum

Neonate: Ointment Apply 1 cm ribbon to lower conjunctival sac of each eye once after birth

Administer:

Ophthalmic route

• Apply ribbon of ointment directly to the eye; for ophthalmic use only

SIDE EFFECTS

EENT: Hypersensitivity, irritation, redness

PHARMACOKINETICS

Unknown

NURSING CONSIDERATIONS

Assess:

• **Allergic reaction:** Assess for hypersensitivity, discontinue product

Evaluate:

• Decreased ophthalmic infection

Teach patient/family:

Ophthalmic route:

• Apply ribbon of ointment directly to the eye; for ophthalmic use only

erythromycin base (Rx)
(eh-rith-roh-my'sin)
Apo-Erythro ♣, Ery-Tab, Novo-Rythro Encap ♣, PCE

erythromycin ethylsuccinate (Rx)
Apo-Erythro-Es ♣, E.E.S., Ery Ped, Novo-Rythro ♣

erythromycin lactobionate (Rx)
Erythrocin

erythromycin stearate (Rx)
Apo-Erythro-S ♣, Erythrocin, My-E, Novo-Rythro ♣

Func. class.: Antiinfective
Chem. class.: Macrolide

Do not confuse:
erythromycin/azithromycin

ACTION:

Binds to 50S ribosomal subunits of susceptible bacteria and suppresses protein synthesis

USES:

Infections caused by *Neisseria gonorrhoeae;* mild to moderate respiratory tract, skin, soft-tissue infections caused by *Bordetella pertussis, Borrelia burgdorferi, Chlamydia trachomatis; Corynebacterium diphtheriae, Haemophilus influenzae* (when used with sulfonamides); *Legionella pneumophila,* Legionnaire's disease, *Listeria monocytogenes; Mycoplasma pneumoniae, Streptococcus pneumoniae,* syphilis: *Treponema pallidum; Staphylococcus* sp.

Unlabeled uses: Bartonellosis, burn wound infection, chancroid, cholera, diabetic gastroparesis, endocarditis, prophylaxis, gastroenteritis, granuloma inguinale, Lyme disease, tetanus

CONTRAINDICATIONS:
Hypersensitivity, preexisting hepatic disease (estolate)

Precautions: Pregnancy (B), breastfeeding, geriatric patients, hepatic disease, GI disease, QT prolongation, seizure disorder, myasthenia gravis

DOSAGE AND ROUTES

Acne vulgaris

• **Adult: PO** 250 mg qid

Mild to moderately severe upper respiratory tract infections (otitis media, sinusitis) or lower respiratory tract infections (pneumonia, bronchitis) caused by susceptible organisms

• **Adult: PO** 250–500 mg (of base, estolate, or stearate) every 6 hr or 400–800 mg (ethylsuccinate) every 6 hr; **IV** 15–20 mg/kg/day in divided doses every 4–6 hr, max 4 g/day

• **Adolescent/child/infant: PO** 20–50 mg/kg/day divided every 6 hr, max adult doses; **IV** 15–20 mg/kg/day in divided doses every 4–6 hr, or as a continuous inf, max dose 4 g/day

• **Neonate >7 days, ≥1200 g: PO** 30 mg/kg/day in divided doses every 8 hr

• **Neonates >7 days, <1200 g: PO** 20 mg/kg/day in divided doses every 12 hr

• **Neonates ≤7 days: PO** 20 mg/kg/day in divided doses every 12 hr

Pneumonia caused by *Chlamydia trachomatis*

• **Infant/neonate: PO** CDC recommends 50 mg/kg/day in 4 divided doses × 14 days (erythromycin base or ethylsuccinate)

Mycoplasma infection such as *Mycoplasma pneumoniae* pneumonia

• **Adult: PO** 250–500 mg tid

• **Adult/adolescent/child/infant: IV** 15–20 mg/kg/day, given in divided doses every 4–6 hr, or as a continuous inf, max dose 4 g/day; replace by oral dosage as soon as possible

Legionnaire's disease (caused by *Legionella pneumophila*)

• **Adult: PO/IV** 0.5–1 g every 6 hr × 21 days

Treatment of group A β-hemolytic streptococcal (GAS) pharyngitis (primary rheumatic fever prophylaxis)

• **Adult: PO** 250–500 mg (base, estolate, or stearate) every 6 hr or 400–800 mg (ethylsuccinate) every 6 hr × 10 days

• **Adolescent/child/infant: PO** 20–50 mg/kg/day, divided every 6 hr × 10 days, max adult dose

Secondary prevention of rheumatic fever (prevention of recurrent attacks of rheumatic fever)

• **Adult/adolescent/child: PO** 250 mg bid in patients allergic to penicillin and sulfADIAZINE for 10 yr or age 40 whichever is longer, secondary prophylaxis (American Heart Association)

Listeriosis

• **Adult: PO** 250–500 mg (base, estolate or stearate) every 6 hr or 400–800 mg (ethylsuccinate) every 6 hr

• **Adolescent/child/infant: PO** 20–50 mg/kg/day, divided every 6 hr, max adult doses

Cervicitis caused by *Chlamydia trachomatis*

• **Adult/adolescent: PO** CDC recommends erythromycin base 500 mg qid or erythromycin ethylsuccinate 800 mg qid × 7 days as alternatives to first-line agents doxycycline or azithromycin

• **Pregnant females: PO** As alternatives to first-line agents azithromycin or amoxicillin, CDC recommends base 500 mg qid × 7 days, base 250 mg qid × 14 days, ethylsuccinate 800 mg qid × 7 days, ethylsuccinate 400 mg qid × 14 days

• **Child ≤45 kg: PO** CDC recommends base or ethylsuccinate 50 mg/kg/day in 4 doses × 14 days

Proctitis caused by *Chlamydia trachomatis*

• **Adult/adolescent: PO** (base) 500 mg qid

Chlamydial conjunctivitis caused by *Chlamydia trachomatis* including trachoma and inclusion conjunctivitis

• **Pregnant/lactating woman/child <8 yr: PO** 250–500 mg qid × 10–14 days

Infant pneumonia caused by *Chlamydia trachomatis*

• **Infant/neonate: PO** (base or ethylsuccinate) CDC recommends 50 mg/kg/day 4 divided doses × 14 days

Non-gonococcal urethritis (NGU) caused by *Chlamydia trachomatis* or *Ureaplasma urealyticum*

• **Adult/adolescent: PO** CDC recommends 500 mg (base) qid or 800 mg (ethylsuccinate) qid × 7 days as alternatives to first-line agents doxycycline or azithromycin

• **Pregnant female: PO** CDC recommends base 500 mg qid × 7 days

• **Child <45 kg: PO** CDC recommends base 50 mg/kg/day in 4 divided doses × 10–14 days, second course of therapy may be required

Ophthalmia neonatorum caused by *Chlamydia trachomatis*

• **Neonate: PO** (erythromycin base or ethylsuccinate) CDC recommends 50 mg/kg/day in qid × 14 days, may repeat if condition returns

Lymphogranuloma venereum caused by *Chlamydia trachomatis*

• **Adult: PO** (base) CDC recommends 500 mg qid × 21 days as an alternative to doxycycline

Adjunctive treatment of diphtheria to prevent establishment of carrier state and to eradicate *Corynebacterium diphtheriae* in carriers

• **Adult: PO** 500 mg every 6 hr × 10 days

Intestinal amebiasis (unable to take metroNIDAZOLE)

• **Adult: PO** 250 mg every 6 hr × 10–14 days

• **Adolescent/child: PO** 30–50 mg/kg/day, divided every 6 hr × 10–14 days, max adult dose

Acute pelvic inflammatory disease (PID) caused by *Neisseria gonorrhoeae*

• **Adult: IV** 500 mg (lactobionate) every 6 hr × 3 days, then PO 250 mg (base, estolate, stearate) or **PO** 400 mg (ethylsuccinate) every 6 hr × 7 days

Pertussis (whooping cough) caused by *Bordetella pertussis* or for postexposure pertussis prophylaxis:

• **Adult: PO** 500 mg qid (2 g total) × 14 days

• **Adolescent/child/infant: PO** 40–50 mg/kg/day (max 2 g/day) in 4 divided doses × 14 days

Primary or secondary syphilis (caused by *Treponema pallidum*) in penicillin-allergic nonpregnant patients

• **Adult: PO** (CDC) 500 mg qid × 14 days as an alternative therapy

Surgical infection prophylaxis as a bowel preparation in combination with neomycin

• **Adult:** It is generally recommended that if surgery is scheduled for 8 am, 1 g of erythromycin PO with neomycin sulfate PO should be given at 1 pm, 2 pm, and 11 pm on the day before surgery

Available forms: *Base:* enteric-coated tabs 250, 333, 500 mg; film-coated tabs 250, 500 mg; enteric-coated caps 250, 333 mg; *stearate:* film-coated tabs 250 mg; *ethylsuccinate:* granules for oral susp 200, 400 mg/5 ml; powder for inj 500 mg, 1 g (lactobionate), 1 g (as gluceptate)

Administer:

• Do not break, crush, or chew time rel cap or tab; chew only chewable tabs; enteric-coated tablets may be given with food

• Do not give by IM or IV push

• Oral product with full glass of water; do not give with fruit juice

• Give 1 hr before or 2 hr after meals

• Chew tab: crush or chew

IV route

• After **reconstituting** 500 mg or less/10 ml sterile water without preservatives; dilute further in 100-250 ml of 0.9% NaCl, LR, Normosol-R; may be **further diluted** to 1 mg/ml and **given** as cont inf; run 1 g or less/100 ml over 1/2-1 hr; cont inf over 6 hr, may require buffers to neutralize pH if dilution is <250 ml, use inf pump

Lactobionate

Y-site compatibilities: Acyclovir, alfentanil, amikacin, aminocaproic acid, aminophylline, amiodarone, anidulafungin, atenolol, atosiban, atracurium, atropine, azaTHIOprine, benztropine, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, caspofungin, cefotaxime, cefTAZidime, cefTRIAXone, cefuroxime, chlorproMAZINE, cimetidine, CISplatin, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexmedetomidine, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, doxacurium, doxapram, DOXOrubicin, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, epoetin alfa, eptifibatide, ertapenem, esmolol, etoposide, famotidine, fenoldopam, fentaNYL, fluconazole, fludarabine, fluorouracil, folic acid, foscarnet, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, hydrocortisone, HYDROmorphone, hydrOXYzine, IDArubicin, ifosfamide, imipenem-cilastatin, insulin (regular), irinotecan, isoproterenol, labetalol, levofloxacin, lidocaine, LORazepam, LR, mannitol, mechlorethamine, meperidine, methicillin, methotrexate, methoxamine, methyldopate, methylPREDNISolone, metoclopramide, metroNIDAZOLE, miconazole, midazolam, milrinone, mitoXANtrone, morphine, multiple vitamins injection, mycophenolate, nafcillin, nalbuphine, naloxone, nesiritide, netilmicin, niCARdipine, nitroglycerin, norepinephrine, octreotide, ondansetron, oxacillin, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pamidronate, pancuronium, papaverine, pentamidine, pentazocine, perphenazine, phenylephrine, phytonadione, piperacillin, piperacillin-tazobactam, polymyxin B, procainamide, prochlorperazine, promethazine, propranolol, protamine, pyridoxine, quiNIDine, ranitidine, Ringer's, ritodrine, sodium acetate/bicarbonate, succinylcholine, SUFentanil, tacrolimus, temocillin, teniposide, theophylline, thiamine, thiotepa, tigecycline, tirofiban, TNA, tobramycin, tolazoline, TPN, trimetaphan, urokinase, vancomycin, vasopressin, vecuronium, verapamil, vinCRIStine, vinorelbine, vitamin B complex/C, voriconazole, zidovudine, zoledronic acid

SIDE EFFECTS

CNS: Seizures
CV: Dysrhythmias, QT prolongation
EENT: Hearing loss, tinnitus
GI: *Nausea, vomiting, diarrhea,* hepatotoxicity, abdominal pain, stomatitis, heartburn, anorexia, pseudomembranous colitis
GU: *Vaginitis, moniliasis*
INTEG: Rash, urticaria, pruritus, thrombophlebitis (IV site)
SYST: Anaphylaxis

PHARMACOKINETICS

Peak 4 hr (base); 1/2-2 1/2 hr (ethylsuccinate); half-life 1-2 hr; metabolized in liver; excreted in bile, feces; protein binding 75%-90%; inhibitor of CYP3A4 and P-glycoprotein

INTERACTIONS

⚠ Serious dysrhythmias—diltiazem, itraconazole, ketoconazole, nefazodone, pimozide, protease inhibitors, verapamil
Increase: action, toxicity of alfentanil, ALPRAZolam, bromocriptine, busPIRone, carBAMazepine, cilostazol, clindamycin, cloZAPine, cycloSPORINE, diazepam, digoxin, disopyramide, ergots, felodipine, HMG-CoA reductase inhibitors, methylPREDNISolone, midazolam,

E

quiNIDine, rifabutin, sildenafil, tacrolimus, tadalafil, theophylline, triazolam, vardenafil, vinBLAStine, warfarin

Drug/Lab Test

Increase: AST/ALT

Decrease: folate assay

False increase: 17-OHCS/17-KS

NURSING CONSIDERATIONS

Assess:

- **Infection:** temp, characteristics of wounds, urine, stools, sputum, WBCs at baseline and periodically
- I&O ratio; report hematuria, oliguria in renal disease
- Hepatic studies: AST, ALT if patient is receiving long-term therapy
- Hearing at baseline and after treatment
- Renal studies: urinalysis, protein, blood
- C&S before product therapy; product may be given as soon as culture is taken; C&S may be repeated after treatment
- **Pseudomembranous colitis:** diarrhea with blood, mucus; abdominal pain, fever; product should be discontinued immediately, notify prescriber
- **Anaphylaxis:** generalized hives, itching, flushing, swelling of lips, tongue, throat, wheezing; have emergency equipment nearby
- **QT prolongation:** may occur (IV >15 mg/min); those with electrolyte imbalances, congenital QT prolongation, elderly at greater risk; correct electrolyte imbalances before treatment, ECG

Perform/provide:

- Storage at room temp; store susp in refrigerator
- Adequate intake of fluids (2 L) during diarrhea episodes

Evaluate:

- Therapeutic response: decreased symptoms of infection

Teach patient/family:

- To report sore throat, fever, fatigue (could indicate superinfection), rhythm changes in the heart, hearing loss
- To notify nurse of diarrhea stools, dark urine, pale stools, jaundice of eyes or skin, severe abdominal pain
- To take at evenly spaced intervals; to complete dosage regimen; to take without food

TREATMENT OF HYPERSENSITIVITY: Withdraw product; maintain airway; administer EPINEPHrine, aminophylline, O_2, IV corticosteroids

erythromycin (topical)

(e-rith-roe-mye'sin)

Acne-mycin, Ery-sol ♣

Func. class.: Topical anti-infective, anti-acne

Chem. class.: Macrolide

ACTION: Antibacterial activity results from inhibition of protein synthesis; bacteriostatic

USES: Treatment of acne vulgaris

CONTRAINDICATIONS: Hypersensitivity, children

DOSAGE AND ROUTES

Acne vulgaris

- **Adult/adolescent: TOP** Apply to affected areas bid, AM, PM

Available forms: Topical gel, ointment, pledget, solution 2%

Administer:

Topical route

- For external use only; do not use skin products near the eyes, nose, or mouth
- Wash hands before and after use. Wash affected area and gently pat dry before using
- **Gel/ointment/pledget/solution:** Apply to the cleansed affected area. Massage gently into affected areas
- Each pledget should be used once and discarded

SIDE EFFECTS

INTEG: Burning, rash, pruritus, peeling, irritation

NURSING CONSIDERATIONS

Assess:

- **Allergic reaction:** Assess for hypersensitivity, product might need to be discontinued
- **Infection:** Assess for number of lesions, severity in acne

Evaluate:

- Decreased lesions in acne

Teach patient/family:

Topical Route:

- That product is for external use only; do not use skin products near the eyes, nose, or mouth
- To wash hands before and after use, wash affected area and gently pat dry before using
- **Gel/pledget/solution/ointment/lotion:** To apply to the cleansed affected area; massage gently into affected areas
- That each pledget should be used once and discarded

escitalopram (Rx)

(es-sit-tal'oh-pram)

Lexapro

Func. class.: Antidepressant, SSRI (selective serotonin reuptake inhibitor)

ACTION: Inhibits CNS neuron uptake of serotonin but not of norepinephrine

USES: General anxiety disorder; major depressive disorder in adults/adolescents
Unlabeled uses: Panic disorder, social phobia

CONTRAINDICATIONS: Hypersensitivity to this product, citalopram
Precautions: Pregnancy (C), breastfeeding, geriatric patients, renal/hepatic disease, history of seizures

Black Box Warning: Children/adolescents ≤12 yr, suicidal ideation

DOSAGE AND ROUTES

- **Adult: PO** 10 mg/day in AM or PM; after 1 wk, if no clinical improvement is noted, dose may be increased to 20 mg/day PM; maintenance 10-20 mg/day; reassess to determine need for treatment

Hepatic dose/geriatric

- **Adult: PO** 10 mg/day

Available forms: Tabs 5, 10, 20 mg; oral sol 5 mg (as base)/5 ml (contains sorbitol)

Administer:

- With food or milk for GI symptoms, give with full glass of water
- Crushed if patient is unable to swallow medication whole
- Dosage at bedtime if oversedation occurs during the day
- Gum, hard candy, frequent sips of water for dry mouth
- **Oral sol:** measure with calibrated device
- Storage at room temp; do not freeze

SIDE EFFECTS

CNS: *Headache, nervousness, insomnia,* **suicidal ideation,** *drowsiness, anxiety, tremor, dizziness, fatigue, sedation, poor concentration, abnormal dreams, agitation,* **seizures,** apathy, euphoria, hallucinations, delusions, psychosis, **neuroleptic malignant-like syndrome**

CV: *Hot flashes, palpitations,* angina pectoris, **hemorrhage,** hypertension, **tachycardia,** 1st-degree AV block, **bradycardia, MI, thrombophlebitis,** postural hypotension

EENT: Visual changes, ear/eye pain, photophobia, tinnitus

GI: *Nausea, diarrhea, dry mouth, anorexia, dyspepsia, constipation, cramps, vomiting, taste changes, flatulence, decreased appetite*

GU: *Dysmenorrhea, decreased libido, urinary frequency, UTI,* amenorrhea, cystitis, impotence, urine retention, ejaculation disorder

INTEG: *Sweating, rash, pruritus,* acne, alopecia, urticaria, photosensitivity

MS: *Pain,* arthritis, twitching

RESP: *Infection, pharyngitis, nasal congestion, sinus headache, sinusitis,*

cough, dyspnea, bronchitis, asthma, hyperventilation, pneumonia
SYST: *Asthenia, viral infection, fever, allergy, chills,* serotonin syndrome

PHARMACOKINETICS

PO: Metabolized in liver; excreted in urine; 56% protein binding; metabolized by CYP2C19, 3A4, half-life 27-32 hr; half-life increased by 50% in geriatric patients

INTERACTIONS

• Paradoxical worsening of OCD: busPIRone
Increase: serotonin syndrome—tryptophan, amphetamines, busPIRone, lithium, amantadine, bromocriptine, SSRI, SNRIs, serotonin-receptor agonists, tramadol
⚠ Do not use pimozide, MAOIs, with or 14 days before escitalopram
Increase: CNS depression—alcohol, antidepressants, opioids, sedatives
Increase: side effects of escitalopram—highly protein-bound products
Increase: levels or toxicity of carBAMazepine, lithium, warfarin, phenytoin, antipsychotics, antidysrhythmics
Increase: levels of tricyclics, phenothiazines, haloperidol, diazepam
Increase: bleeding risk—NSAIDs, salicylates, anticoagulants, SSRIs, platelet inhibitors
Decrease: escitalopram effect—cyproheptadine

Drug/Herb

• St. John's wort: do not use together, serotonin syndrome may occur
Increase: CNS effect—kava, valerian

Drug/Food

• Grapefruit juice—increased escitalopram effect

Drug/Lab Test

Increase: serum bilirubin, blood glucose, alk phos
Decrease: VMA, 5-HIAA
False increase: urinary catecholamines

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Mental status: mood, sensorium, affect, **suicidal tendencies,** increase in psychiatric symptoms, depression, panic, not approved for use in children

• Appetite with bulimia nervosa, weight daily; increase nutritious foods in diet, watch for binging and vomiting
• **Allergic reactions:** itching, rash, urticaria; product should be discontinued, may need to give antihistamine
• B/P (lying/standing), pulse q4hr; if systolic B/P drops 20 mm Hg, hold product, notify prescriber
• Blood studies: CBC, leukocytes, differential, cardiac enzymes if patient receiving long-term therapy; check platelets; bleeding can occur
• **Serotonin syndrome:** nausea, vomiting, sedation, dizziness, sweating, facial flushing, mental changes, shivering, increased B/P; discontinue product, notify prescriber
• Hepatic studies: AST, ALT, bilirubin, creatinine; thyroid function studies
• Weight weekly; appetite may decrease with product
• **ECG** for flattening of T wave, bundle branch, AV block, dysrhythmias in cardiac patients
• Alcohol consumption; if alcohol is consumed, hold dose until AM
• **Sexual dysfunction:** ejaculation dysfunction, erectile dysfunction, decreased libido, orgasm dysfunction, priapism
• Assistance with ambulation during therapy, since drowsiness, dizziness occur; safety measures primarily for geriatric patients

Evaluate:

• Therapeutic response: decreased depression

Teach patient/family:

• That therapeutic effect may take 1-4 wk, may have increased anxiety for first 5-7 days
• To use caution when driving, performing other activities requiring alertness

because drowsiness, dizziness, blurred vision may occur
• To avoid alcohol, other CNS depressants; to avoid all OTC products unless approved by prescriber
• To notify prescriber if pregnant or planning to become pregnant or breastfeeding
• To change positions slowly, orthostatic hypotension may occur
• To report signs of urinary retention immediately

Black Box Warning: That clinical worsening and suicide risk may occur

• To use MedGuide provided

TREATMENT OF OVERDOSE: Activated charcoal, supportive care, serotonin antagonist

esmolol (Rx)

(ez'moe-lole)

Brevibloc

Func. class.: β-Adrenergic blocker (antidysrhythmic II)

Do not confuse:
esmolol/Osmitrol
Brevibloc/Brevital

ACTION: Competitively blocks stimulation of β_1-adrenergic receptors in the myocardium; produces negative chronotropic, inotropic activity (decreases rate of SA node discharge, increases recovery time), slows conduction of AV node, decreases heart rate, decreases O_2 consumption in myocardium; also decreases renin-aldosterone-angiotensin system at high doses; inhibits β_2-receptors in bronchial system at higher doses

USES: Supraventricular tachycardia, noncompensatory sinus tachycardia, hypertensive crisis, intraoperative and postoperative tachycardia and hypertension
Unlabeled uses: Acute MI, ECT, thyroid storm, pheochromocytoma

CONTRAINDICATIONS: 2nd- or 3rd-degree heart block; cardiogenic shock, CHF, cardiac failure, hypersensitivity, severe bradycardia
Precautions: Pregnancy (C), breastfeeding, geriatric patients, hypotension, peripheral vascular disease, diabetes, hypoglycemia, thyrotoxicosis, renal disease, atrial fibrillation, bronchospasms, hyperthyroidism, myasthenia gravis

Black Box Warning: Abrupt discontinuation

DOSAGE AND ROUTES

• **Adult: IV** loading dose 500 mcg/kg/min over 1 min; maintenance 50 mcg/kg/min for 4 min; if no response after 5 min, give 2nd loading dose then increase inf to 100 mcg/kg/min for 4 min; if no response, repeat loading dose then increase maintenance inf by 50 mcg/kg/min (max of 200 mcg/kg/min); titrate to patient response
• **Child: IV** total loading dose of 600 mcg/kg over 2 min, maintenance **IV INF** 200 mcg/kg/min, titrate upward by 50-100 mcg/kg/min q5-10min until B/P, heart rate reduced by >10%
Available forms: Inj 10 mg, 20 mg/ml
Administer:
• Do not discontinue product suddenly
• Store protected from light, moisture; in cool environment
IV route
• Check that correct concentration being given
• 10 mg/ml inj sol needs no dilution, may be used as an IV loading dose using a handheld syringe
Continuous IV INF route
• Ready-to-use bags of premixed isotonic sol of 10 mg/ml and 20 mg/ml available in 100-, 250-ml bags; use controlled inf device, central line preferred; rate is based on patient's weight

Additive compatibilities: Aminophylline, atracurium, heparin, potassium chloride, sodium bicarbonate

Y-site compatibilities: Amikacin, aminophylline, amiodarone, atracurium, butorphanol, calcium chloride, ceFAZolin, ceftAZidime, ceftizoxime, chloramphenicol, cimetidine, cisatracurium, clindamycin, diltiazem, DOPamine, enalaprilat, erythromycin, famotidine, fentaNYL, gentamicin, insulin (regular), labetalol, magnesium sulfate, methyldopate, metroNIDAZOLE, midazolam, morphine, nitroglycerin, nitroprusside, norepinephrine, pancuronium, penicillin G potassium, piperacillin, polymyxin B, potassium chloride, potassium phosphate, propofol, ranitidine, remifentanil, streptomycin, tacrolimus, tobramycin, trimethoprim-sulfamethoxazole, vancomycin, vecuronium, voriconazole, zoledronic acid

SIDE EFFECTS

CNS: Confusion, lightheadedness, paresthesia, somnolence, fever, dizziness, fatigue, headache, depression, anxiety, seizures

CV: Hypotension, bradycardia, chest pain, peripheral ischemia, SOB, CHF, conduction disturbances; 1st-, 2nd-, 3rd-degree heart block

GI: *Nausea,* vomiting, anorexia, gastric pain, flatulence, constipation, heartburn, bloating

GU: Urinary retention, impotence, dysuria

INTEG: *Induration, inflammation at site,* discoloration, edema, erythema, burning pallor, flushing, rash, pruritus, dry skin, alopecia

RESP: Bronchospasm, dyspnea, cough, wheeziness, nasal stuffiness, pulmonary edema

PHARMACOKINETICS

Onset very rapid, duration short, half-life 9 min, metabolized by hydrolysis of ester linkage, excreted via kidneys

INTERACTIONS

- Avoid use with MAOIs

Increase: antihypertensive effect—general anesthetics

Increase: digoxin levels—digoxin

Increase: α-adrenergic stimulation—ePHEDrine, EPINEPHrine, amphetamine, norepinephrine, phenylephrine, pseudoePHEDrine

Decrease: action of thyroid hormones

Decrease: action of esmolol—thyroid hormone

Drug/Herb

Increase: β-blocking effect—hawthorn

Decrease: antihypertensive effect—ephedra

Drug/Lab Test

Interference: glucose/insulin tolerance test

NURSING CONSIDERATIONS

Assess:

- **CHF:** I&O ratio, weight daily, jugular venous distention, weight gain, crackles, edema
- **Dysrhythmias:** B/P, pulse q4hr; note rate, rhythm, quality; rapid changes can cause shock; if systolic <100 or diastolic <60, notify prescriber before giving product; ECG continuously during inf, hypotension common, if severe, slow or stop infusion
- Baselines in renal/hepatic studies, blood glucose before therapy begins
- **Bronchospasm:** breath sounds, respiratory pattern

Evaluate:

- Therapeutic response: lower B/P immediately, lower heart rate

Teach patient/family:

- About reason for use, expected results
- To notify prescriber if chest pain, SOB, wheezing, hypotension, bradycardia, pain, swelling at IV site occurs

TREATMENT OF OVERDOSE:

Discontinue product

esomeprazole (Rx)

(ee'oh-mep'rah-zohl)

NexIUM

Func. class.: Antiulcer

Chem. class.: Proton pump inhibitor, benzimidazole

Do not confuse:
NexIUM/NexAVAR

ACTION: Suppresses gastric secretions by inhibiting hydrogen/potassium ATPase enzyme system in gastric parietal cell, characterized as gastric acid pump inhibitor because it blocks the final step of acid production

USES: Gastroesophageal reflux disease (GERD), adult/child/infant; severe erosive esophagitis, adult/child; treatment of active duodenal ulcers in combination with antiinfectives for *Helicobacter pylori* infection; long-term use for hypersecretory conditions

CONTRAINDICATIONS: Hypersensitivity to proton pump inhibitors (PPIs)

Precautions: Pregnancy (B), breastfeeding, children, geriatric patients

DOSAGE AND ROUTES

Active duodenal ulcers associated with *H. pylori*

- **Adult: PO** 40 mg/day × 10 days in combination with clarithromycin 500 mg bid × 10 days and amoxicillin 1000 mg bid × 10 days

Hepatic dose

- **Adult: PO/IV** max 20 mg/day (severe hepatic disease)

GERD/erosive esophagitis

- **Adult: PO** 20 or 40 mg/day × 4-8 wk; no adjustment needed in renal/liver failure, geriatric patients; **IV** 20 or 40 mg/day up to 10 days
- **Adolescent and child 12-17 yr: PO** 20 or 40 mg/day 1 hr before meals for ≤8 wk
- **Child 1-11 yr and ≥20 kg: PO** 10 mg/day 1 hr before meals for ≤8 wk
- **Infant ≥1 mo: IV** 0.5 mg/day over 10-30 min
- **Infant 1-11 mo (>7.5-12 kg): PO** 10 mg daily × up to 6 wk
- **Infant 1-11 mo (>5-7.5 kg): PO** 5 mg daily × up to 6 wk
- **Infant 1-11 mo (3-5 kg): PO** 2.5 mg daily × up to 6 wk

Available forms: Del rel caps 20, 40 mg; powder for IV inj 20, 40 mg/vial; del rel powder for oral susp 10, 20, 40 mg

Administer:

PO route

- Swallow caps whole; do not crush or chew; cap may be opened and sprinkled over Tbsp of applesauce
- Same time daily, 1 hr before meal
- **Oral susp (del rel):** empty contents of packet into container with 1 Tbsp of water, let stand 2-3 min to thicken, restir, give within 30 min of mixing; any residual product should be flushed with more water, taken immediately
- **NG tube (del rel oral susp):** add 15 ml water to contents of packet in syringe, shake, leave 2-3 min to thicken, shake, inject through NG tube within 30 min

IV, direct route

- Reconstitute each vial with 5 ml 0.9% NaCl, D_5W, LR; give over 3 min

Intermittent IV INF route

- Dilute reconstituted sol to 50 ml, give over 30 min, do not admix, flush line with D_5W, 0.9% NaCl, LR after inf

Solution compatibilities: D_5W, LR, 0.9% NaCl

SIDE EFFECTS

CNS: *Headache, dizziness*

GI: *Diarrhea, flatulence,* abdominal pain, constipation, dry mouth, hepatic failure, hepatitis, microscopic colitis

INTEG: *Rash,* dry skin

MISC: Heart failure

RESP: *Cough,* pneumonia

SYST: Stevens-Johnson syndrome, toxic epidermal necrolysis, exfoliative dermatitis

PHARMACOKINETICS

Well absorbed 90%; protein binding 97%; extensively metabolized in liver (CYP2C19); terminal half-life 1-1.5 hr; eliminated in urine as metabolites and in feces; in geriatric patients, elimination rate decreased, bioavailability increased

INTERACTIONS

Increase: effect, toxicity of diazepam, digoxin, penicillins, saquinavir

Decrease: effect—atazanavir, nelfinavir, dapsone, iron, itraconazole, ketoconazole, indinavir, calcium carbonate, vit B_{12}, clopidogrel

Drug/Lab Test

Interference: sodium, Hgb, WBC, platelets, magnesium

NURSING CONSIDERATIONS

Assess:

- GI system: bowel sounds q8hr, abdomen for pain, swelling, anorexia
- **Hepatic failure, hepatitis:** AST, ALT, alk phos at baseline and periodically during treatment
- **Serious skin disorders:** Stevens-Johnson syndrome, toxic epidermal necrolysis, exfoliative dermatitis

Evaluate:

- Therapeutic response: absence of epigastric pain, swelling, fullness

Teach patient/family:

- To report severe diarrhea; abdominal pain; black, tarry stools, rash; product may have to be discontinued
- That hypoglycemia may occur if diabetic
- To avoid hazardous activities; dizziness may occur
- To avoid alcohol, salicylates, NSAIDs; may cause GI irritation
- To take ≥1 hr before meal; not to crush, chew del rel product
- If cap is unable to be swallowed, whole contents may be mixed with a Tbsp of applesauce

estradiol (Rx)
(es-tra-dye'ole)
Estrace
estradiol cypionate (Rx)
Depo-Estradiol
estradiol gel (Rx)
Divigel, Elestrin, Estrogel
estradiol spray (Rx)
Evamist
estradiol topical emulsion (Rx)
Estrasorb
estradiol valerate (Rx)
Delestrogen
estradiol transdermal system (Rx)
Alora, Climara, Menostar, Vivelle-Dot
estradiol vaginal tablet (Rx)
Vagifem
estradiol vaginal ring (Rx)
Estring, Femring
Func. class.: Estrogen, progestins

ACTION: Needed for adequate functioning of female reproductive system; affects release of pituitary gonadotropins; inhibits ovulation, adequate calcium use in bone

USES: Vasomotor symptoms (menopause), inoperable breast cancer (selected cases), prostatic cancer, atrophic vaginitis, kraurosis vulvae, hypogonadism, primary ovarian failure, prevention of osteoporosis, castration

CONTRAINDICATIONS: Pregnancy (X), breastfeeding, reproductive cancer, genital bleeding (abnormal, un-

diagnosed), protein C, protein S, antithrombin deficiency

Black Box Warning: Breast/endometrial cancer, thromboembolic disorders, MI, stroke

Precautions: Hypertension, asthma, blood dyscrasias, gallbladder/bone/renal/hepatic disease, CHF, diabetes mellitus, depression, migraine headache, seizure disorders, family history of cancer of breast or reproductive tract, smoking, uterine fibroids, vaginal irritation/infection, accidental exposure of children, pets to topical product, history of angioedema

Black Box Warning: Cardiac disease, dementia

DOSAGE AND ROUTES

Hormone replacement/menopause symptoms

• **Adult: TRANSDERMAL** 1 patch delivering 0.025, 0.0375, 0.05, 0.075, or 0.1 mg/day 2×/wk (Alora, Estraderm, Vivelle-Dot); 1 patch delivering 0.025, 0.0375, 0.05, 0.06, 0.075, or 0.1 mg/day replace q7days (Climara); 1 patch delivering 0.025 mg/day, replace q7days, may increase to 2 patches after 4-6 wk; **GEL** apply entire unit-dose packet to 5 × 7-inch area of upper thigh/day, alternate thighs; **SPRAY** (Evamist) 1 spray to inner surface of forearm/day in AM

Menopause/hypogonadism/castration/ovarian failure

• **Adult: PO** 1-2 mg/day, 3 wk on, 1 wk off or 5 days on, 2 days off; **IM** (cypionate) 1-5 mg q3-4wk; (valerate) 10-20 mg q4wk

• **Adult: TOP** (Estraderm) 0.05 mg/24 hr applied 2×/wk; (Climara) 0.05 mg/hr applied 1×/wk in cyclic regimen; women with hysterectomy may use continuously

Prostatic cancer (inoperable)

• **Adult: IM** (valerate) 30 mg q1-2wk; **PO** (oral estradiol) 1-2 mg bid-tid

Breast cancer (palliative treatment)

• **Adult: PO** 10 mg tid × 3 mo or longer

Atropic vaginitis/kraurosis vulvae

• **Adult: VAG CREAM** 2-4 g/day × 1-2 wk, then 1 g 1-3×/wk cycled; vag tab 1/day × 2 wk, maintenance 1 tab 2×/wk; **VAG RING** inserted, left in place continuously for 3 mo

Vasomotor symptoms

• **Adult: TOP** after cleaning and drying skin on left thigh, calf, rub in contents of pouch using both hands until completely absorbed; wash hands

Available forms: ***Estradiol:*** tabs 0.5, 1, 2 mg; ***valerate:*** inj 10, 20, 40 mg/ml; ***transdermal:*** 0.025, 0.0375, 0.05, 0.06, 0.075, 0.1 mg/24 hr release rate; ***vag cream:*** 100 mcg/g; ***vag tab:*** 10 mcg; ***vag ring:*** 2 mg/90 days; ***topical emulsion:*** 2.5 mg; ***gel*** (Divigel) 0.1%; ***spray*** (Evamist) 1.53 mg/acuation

Administer:

• Titrated dose; use lowest effective dose

• IM inj deeply in large muscle mass

PO route

• With food or milk to decrease GI symptoms

Transdermal route

• May contain aluminum or other metals in backing of patch, can overheat in MRI scan and burn patients

• Apply to trunk of body 2×/wk; press firmly, hold in place for 10 sec to ensure good contact; do not apply to breasts

• On intermittent cycle schedule: 3 wk on then 1 wk off; if patch falls off, reapply

Topical route

• Use Evamist daily; spray to inner upper arm; may increase to 2-3×/day based on response; allow to dry for 2 min, avoid secondary exposure to children, pets, caregivers

Vaginal route

• Use a new applicator daily, provided

SIDE EFFECTS

CNS: Dizziness, headache, migraines, depression, seizures

CV: Hypertension, thrombophlebitis, edema, thromboembolism, stroke, pulmonary embolism, MI, chest pain

EENT: Contact lens intolerance, increased myopia, astigmatism, throat swelling, eyelid edema
GI: *Nausea,* vomiting, diarrhea, anorexia, pancreatitis, cramps, constipation, increased appetite, increased weight, cholestatic jaundice, hepatic adenoma
GU: Amenorrhea, cervical erosion, breakthrough bleeding, dysmenorrhea, vaginal candidiasis, breast changes, *gynecomastia, testicular atrophy, impotence,* increased risk of breast cancer, endometrial cancer, changes in libido; toxic shock, vaginal wall ulceration/erosion (vag ring)
INTEG: Rash, urticaria, acne, hirsutism, alopecia, oily skin, seborrhea, purpura, erythema, pruritus, melasma; site irritation (transdermal)
META: Folic acid deficiency, hypercalcemia, hyperglycemia

PHARMACOKINETICS

PO/INJ/TRANSDERMAL: Degraded in liver, excreted in urine, crosses placenta, excreted in breast milk

INTERACTIONS

Increase: action of corticosteroids
Increase: toxicity—cycloSPORINE, dantrolene
Decrease: action of anticoagulants, oral hypoglycemics, tamoxifen
Decrease: estradiol action—anticonvulsants, barbiturates, phenylbutazone, rifampin, calcium

Drug/Herb

• Altered estrogen effect: black cohosh, DHEA
Decrease: estrogen effect—saw palmetto, St. John's wort

Drug/Food

Increase: estrogen level—grapefruit juice

Drug/Lab Test

Increase: BSP retention test, PBI, T_4, serum sodium, platelet aggregation, thyroxine-binding globulin (TBG), prothrombin; factors VII, VIII, IX, X; triglycerides
Decrease: serum folate, serum triglyceride, T_3 resin uptake test, glucose tolerance test, antithrombin III, pregnanediol, metyrapone test
False positive: LE prep, ANA

NURSING CONSIDERATIONS

Assess:

Black Box Warning: For previous breast/endometrial cancer, thrombo-embolic disorders, MI, stroke, dementia

• Blood glucose of diabetic patient; hyperglycemia may occur
• Weight daily; notify prescriber of weekly weight gain >5 lb; if increase, diuretic may be ordered
• B/P q4hr; watch for increase caused by water and sodium retention
• I&O ratio; decreasing urinary output, increasing edema, report changes
• Hepatic studies, including AST, ALT, bilirubin, alk phos at baseline, periodically; periodic folic acid level
• Hypertension, cardiac symptoms, jaundice, hypercalcemia
• Mental status: affect, mood, behavioral changes, aggression
• Female patient for intact uterus; if so, progesterone should be added to estrogen therapy to decrease risk of endometrial cancer

Evaluate:

• Therapeutic response: reversal of menopause symptoms; decrease in tumor size in prostatic, breast cancer

Teach patient/family:

• To weigh weekly; to report gain >5 lb
⚠ To report breast lumps, vaginal bleeding, edema, jaundice, dark urine, clay-colored stools, dyspnea, headache, blurred vision, abdominal pain, numbness or stiffness in legs, chest pain; tenderness, redness, and swelling in extremities; males to report impotence, gynecomastia; to report dermal rash with transdermal patch
• To avoid grapefruit or grapefruit juice (PO)

RARELY USED

estramustine (Rx)

(ess-tra-muss'teen)

Emcyt

Func. class.: Antineoplastic alkylating agent

USES: Metastatic prostate cancer

CONTRAINDICATIONS: Pregnancy (D), hypersensitivity to estradiol, thromboembolic disorders, stroke, thrombophlebitis

DOSAGE AND ROUTES

• **Adult: PO** 14-16 mg/kg/day or 600 mg/m²/day in 3-4 divided doses; treatment may continue for ≥3 mo

estrogens, conjugated (Rx)

Cenestin, Premarin

estrogens, conjugated synthetic B (Rx)

Enjuvia

Func. class.: Estrogen, hormone

Do not confuse:
Premarin/Provera

ACTION: Needed for adequate functioning of female reproductive system; affects release of pituitary gonadotropins, inhibits ovulation, adequate calcium use in bone

USES: Vasomotor symptoms (menopause), inoperable breast cancer, prostatic cancer, abnormal uterine bleeding, hypogonadism, primary ovarian failure, prevention of osteoporosis, castration, atrophic vaginitis
Unlabeled uses: hyperparathyroidism, infertility

CONTRAINDICATIONS: Pregnancy (X), breastfeeding, thromboembolic disorders, reproductive cancer, genital bleeding (abnormal, undiagnosed), hypersensitivity, MI, stroke, thrombophlebitis

Black Box Warning: Endometrial, breast cancer, thromboembolic diseases

Precautions: Hypertension, asthma, blood dyscrasias, CHF, diabetes mellitus, depression, migraine headache, seizure disorders, gallbladder/bone/hepatic/renal disease, family history of cancer of breast or reproductive tract, smoking, dementia, hypothyroidism, obesity, SLE

DOSAGE AND ROUTES

Estrogens conjugated

Vasomotor symptoms (menopause)
• **Adult: PO** 0.3-1.25 mg/day 3 wk on, 1 wk off
Prevention of osteoporosis
• **Adult: PO** 0.3 mg/day or in cycle
Atrophic vaginitis
• **Adult: VAG CREAM** 0.5 g/day × 21 days, off 7 days, repeat
Prostatic cancer
• **Adult: PO** 1.25-2.5 mg tid
Advanced inoperable breast cancer
• **Adult: PO** 10 mg tid × ≥3 mo
Abnormal uterine bleeding
• **Adult: IV/IM** 25 mg q6-12hr
Castration/primary ovarian failure
• **Adult: PO** 1.25 mg/day 3 wk on, 1 wk off
Hypogonadism
• **Adult: PO** 2.5-7.5 mg/day × 20 days/mo

Estrogens conjugated synthetic B

Vasomotor symptoms (menopause)
• **Adult: PO** 0.625 mg/day initially; may increase based on response

Available forms: Tabs 0.3, 0.45, 0.625, 0.9, 1.25, 2.5 mg; inj 25 mg/vial; vag cream 0.625 mg/g; *synthetic B:* tabs 0.625, 1.25 mg

Administer:

• Titrated dose; use lowest effective dose

PO route

• Give with or immediately after food to reduce nausea

IM route

• IM reconstitute after withdrawing 5 ml of air from container, inject sterile diluent on vial side, rotate to dissolve; give inj deep in large muscle mass, aspirate before inj

Vaginal route

• Use applicator provided, wash after use

Direct IV route

• IV, after reconstituting as for IM, inject into distal port of running IV line of D_5W, 0.9% NaCl at ≤5 mg/min

Y-site compatibilities: Heparin, hydrocortisone, potassium chloride, vit B/C

SIDE EFFECTS

CNS: Dizziness, headache, migraine, depression, seizures, mood disturbances

CV: Hypertension, thrombophlebitis, edema, thromboembolism, stroke, pulmonary embolism, MI, chest pain

EENT: Contact lens intolerance, increased myopia, astigmatism

GI: *Nausea,* vomiting, diarrhea, anorexia, pancreatitis, cramps, constipation, increased appetite, cholestatic jaundice, hepatic adenoma, weight gain/loss

GU: Amenorrhea, cervical erosion, breakthrough bleeding, dysmenorrhea, vaginal candidiasis, breast changes, *gynecomastia, testicular atrophy, impotence,* increased risk of breast cancer, endometrial cancer, libido changes

INTEG: Rash, urticaria, acne, hirsutism, alopecia, oily skin, seborrhea, purpura, melasma

META: Folic acid deficiency, hypercalcemia, hyperglycemia

PHARMACOKINETICS

PO/IM/IV: Degraded in liver, excreted in urine, crosses placenta, excreted in breast milk

INTERACTIONS

Increase: toxicity—cycloSPORINE, dantrolene

Increase: action of corticosteroids

Decrease: action of estrogens—anticonvulsants, barbiturates, phenylbutazone, rifampin

Decrease: action of anticoagulants, oral hypoglycemics, tamoxifen, thyroid

Drug/Food

Increase: estrogen level—grapefruit juice

Drug/Lab Test

Increase: BSP retention test, PBI, T_4, serum sodium, platelet aggregation, thyroxine-binding globulin (TBG), prothrombin; factors VII, VIII, IX, X; triglycerides

Decrease: serum folate, serum triglyceride, T_3 resin uptake test, glucose tolerance test, antithrombin III, pregnanediol, metyrapone test

False positive: LE prep, antinuclear antibodies

NURSING CONSIDERATIONS

Assess:

Black Box Warning: **Breast, endometrial cancer:** estrogens should not be used in known, suspected, or history of these disorders

Black Box Warning: **Stroke, thromboembolic disease of MI:** Should not be used in these conditions or known protein C deficiency, protein S deficiency, or antithrombin deficiency

• Blood glucose if diabetic patient; hyperglycemia may occur

• Weight daily; notify prescriber of weekly weight gain >5 lb; if increase, diuretic may be ordered; check for edema; B/P baseline and periodically

• Hepatic studies: AST, ALT, bilirubin, alk phos

• Hypertension, cardiac symptoms, jaundice, hypercalcemia

• Mental status: affect, mood, behavioral changes, aggression

• Female patient for intact uterus; if so, progesterone should be added to estrogen therapy to decrease risk of endometrial cancer; abnormal uterine bleeding, breast exam; Pap smear

Evaluate:

• Therapeutic response: absence of breast engorgement, reversal of menopause symptoms, decrease in tumor size with prostatic cancer

Teach patient/family:

• To avoid breastfeeding, since product excreted in breast milk

• To weigh weekly; to report gain >5 lb

Black Box Warning: To report breast lumps, vaginal bleeding, edema, jaundice, dark urine, clay-colored stools, dyspnea, headache, blurred vision, abdominal pain; leg pain and redness, numbness or stiffness; chest pain; males to report impotence or gynecomastia

• To avoid sunlight or wear sunscreen; burns may occur

• To notify prescriber if pregnancy is suspected

• That vasomotor symptoms improve in 2 wk, max relief in 8 wk

RARELY USED

estropipate

(ess-troe-pip'ate)

Func. class.: Estrogen

USES: Primary ovarian failure, menopausal symptoms, prevention of osteoporosis, vaginal atrophy

CONTRAINDICATIONS: Hypersensitivity, coagulation disorders, breast and reproductive cancers, undiagnosed genital bleeding

Black Box Warning: Pregnancy (X)

DOSAGE AND ROUTES

Vaginal atrophy/vulval atrophy/menopausal symptoms

• **Adult (women): PO** 0.75-6 mg/day × 3 wk on 1 wk off, may be used continuously in menopausal symptoms

Primary ovarian failure

• **Adult (women): PO** 1.5-9 mg/day × 3 wk, then off for 8-10 days; if bleeding does not occur, repeat cycle

Osteoporosis prevention

• **Adult (women): PO** 0.75 mg/day × 25 days, 6 days off, repeat as needed

E

eszopiclone (Rx)

(es-zop'i-klone)

Lunesta

Func. class.: Sedative/hypnotic, nonbenzodiazepine

Chem. class.: Cyclopyrrolone

Controlled Substance Schedule IV

ACTION: Interacts with GABA receptors

USES: Insomnia

CONTRAINDICATIONS: Hypersensitivity, ethanol intoxication

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, severe hepatic disease, abrupt discontinuation, COPD, depression, labor, sleep apnea, substance abuse, suicidal ideation

DOSAGE AND ROUTES

• **Adult: PO** 2 mg immediately before bed, may increase to 3 mg if needed

Hepatic dose/CYP3A4 inhibitors

• **Adult: PO** 1 mg immediately before bed with severe hepatic disease

Available forms: Tabs 1, 2, 3 mg

Administer:

• Do not break, crush, or chew tab

• Immediately before bedtime; avoid use with food; for short-term use only

SIDE EFFECTS

CNS: Worsening depression, hallucinations, headache, daytime drowsiness, suicidal thoughts/actions, migraine, restlessness, anxiety, sleep driving, sleepwalking
CV: Peripheral edema, chest pain
GI: Dry mouth, bitter taste (dysgeusia)
GU: Gynecomastia, dysmenorrhea
INTEG: Rash, angioedema

PHARMACOKINETICS

Onset rapid; peak 1 hr; duration 6 hr; extensively metabolized in the liver by CYP3A4, CYP2E1; excreted via kidneys; half-life 6 hr, geriatric patients 9 hr, protein binding 52%-59%

INTERACTIONS

Increase: CNS depression—CNS depressants
Increase: toxicity due to decreased eszopiclone elimination—CYP3A4 inhibitors (clarithromycin, itraconazole, ketoconazole, nefazodone, nelfinavir, ritonavir, troleandomycin, SSRIs)
Drug/Food
Decrease: product action—food

NURSING CONSIDERATIONS

Assess:
- **Sleep pattern:** ability to go to sleep, stay asleep, early morning awakenings, conservative methods used
- For abuse of this product, other products
- **Anaphylaxis, angioedema:** monitor during first dose

Perform/provide:
- Alternative methods to improve sleep: reading, quiet environment, warm bath, milk
- Assistance with ambulation, night light, call bell within reach
- Check to see that product swallowed

Evaluate:
- Therapeutic response: ability to fall asleep and stay asleep throughout the night

Teach patient/family:
- That daytime drowsiness may occur, not to engage in hazardous activities until effect is known; that memory problems may occur
- That all other medications and supplements should be avoided unless approved by prescriber; to avoid alcohol
- To notify prescriber if pregnancy is suspected or planned
- To avoid use after a high fat meal
- To swallow tab whole
- Not to stop drug abruptly, tolerance may occur

etanercept (Rx)

(eh-tan'er-sept)

Enbrel

Func. class.: Antirheumatic agent (disease modifying)(DMARDs)
Chem. class.: Anti-TNF agent

ACTION: Binds tumor necrosis factor (TNF), which is involved in immune and inflammatory reactions

USES: Acute, chronic rheumatoid arthritis that has not responded to other disease-modifying agents, polyarticular course of juvenile rheumatoid arthritis (JRA), ankylosing spondylitis, plaque psoriasis, psoriatic arthritis
Unlabeled uses: Crohn's disease; plaque psoriasis (child ≥4 yr)

CONTRAINDICATIONS: Sepsis, active infections

Black Box Warning: Hypersensitivity to product, latex needle cap, benzyl alcohol

Precautions: Pregnancy (B), breastfeeding, children <4 yr, geriatric patients, malignancies, CHF, seizures, multiple sclerosis

Black Box Warning: Infection, lymphoma, neoplastic disease

DOSAGE AND ROUTES

Rheumatoid/psoriatic arthritis, ankylosing spondylitis

- **Adult: SUBCUT** 50 mg/wk or 25 mg 2×/wk, 3-4 days apart
- **Child 2-17 yr: SUBCUT** 0.8 mg/kg/wk, max 50 mg/wk

Plaque psoriasis

- **Adult: SUBCUT** 50 mg 2×/wk × 3 mo
- **Adolescent/child 4-17 yr (unlabeled): SUBCUT** 0.8 mg/kg/wk, max 50 mg/wk

Juvenile rheumatoid arthritis (JRA)

- **Adolescent/child 2-17 yr: SUBCUT** 0.8 mg/kg/wk, max 50 mg/wk

Available forms: Powder for inj 25 mg; inj 50 mg/ml; autoinjector, single use

Administer:

- After reconstituting 1 ml of supplied diluent, slowly inject diluent into vial, swirl contents; do not shake, sol should be clear/colorless, do not use if cloudy, discolored
- Do not admix with other sol or medications, do not use filter
- May be injected SUBCUT into upper arm, abdomen, thigh; rotate inj sites

SIDE EFFECTS

CNS: *Headache,* asthenia, dizziness
GI: Abdominal pain, dyspepsia, vomiting
HEMA: Pancytopenia, anemia, thrombocytopenia, leukopenia, neutropenia
INTEG: Rash, *inj site reaction,* keratoderma blenorrhagicum
RESP: *Pharyngitis, cough, URI, non-URI,* sinusitis, *rhinitis*
SYST: Serious infections, sepsis, death, malignancies

PHARMACOKINETICS

Elimination half-life 102 hr, 60% absorbed (SUBCUT)

INTERACTIONS

- **Increase:** neutropenia—sulfaSALAzine
- Do not give concurrently with vaccines; immunizations should be brought up to date before treatment
- Avoid use with anakinra, cyclophosphamide, rilonacept

NURSING CONSIDERATIONS

Assess:

- **RA:** pain, stiffness, ROM, swelling of joints before, during, after treatment
- For inj site pain, swelling; usually occurs after 2 inj (4-5 days)

Black Box Warning: Infection: patients using immunosuppressives, corticosteroids, methotrexate at greater risk; assess for fever

- **Hypersensitivity:** to this product, latex needle cap, benzyl alcohol; usual reactions to product last 3-5 days

Evaluate:

- Therapeutic response: decreased inflammation, pain in joints

Teach patient/family:

- That product must be continued for prescribed time to be effective
- To use caution when driving; dizziness may occur
- Not to receive live vaccinations during treatment
- About self-administration if appropriate: inj should be made in thigh, abdomen, upper arm; rotate sites at least 1 in from previous site
- To notify prescriber of possible infection (upper respiratory, other)

ethambutol (Rx)

(e-tham'byoo-tole)

Etibi ✦, Myambutol

Func. class.: Antitubercular

Chem. class.: Diisopropylethylene diamide derivative

Do not confuse:
ethambutol/Ethmozine

ACTION: Inhibits RNA synthesis, decreases tubercle bacilli replication

USES: Pulmonary TB as an adjunct, other mycobacterial infections

CONTRAINDICATIONS:

Children <13 yr, hypersensitivity, optic neuritis

Precautions: Pregnancy (B), breastfeeding, renal disease, diabetic retinopathy, cataracts, ocular defects, hepatic and hematopoietic disorders

DOSAGE AND ROUTES

- **Adult/child >13 yr: PO** 15-25 mg/kg/day as single dose, 50 mg/kg 2×/wk, or 25-30 mg/kg 3×/wk

Renal disease

- CCr 10-50 ml/min, dose q24-36hr; CCr <10 ml/min, dose q48hr

Retreatment

- **Adult: PO** 25 mg/kg/day as single dose × 2 mo with at least 1 other product then decrease to 15 mg/kg/day as single dose, max 2.5 g/day
- **Child: PO** 15 mg/kg/day

Available forms: Tabs 100, 400 mg

Administer:

- With meals to decrease GI symptoms
- Antiemetic if vomiting occurs
- After C&S completed; monthly to detect resistance
- 2 hr before antacids

SIDE EFFECTS

CNS: *Headache, confusion,* fever, malaise, dizziness, *disorientation,* hallucinations, peripheral neuropathy

EENT: Blurred vision, optic neuritis, photophobia, decreased visual acuity

GI: *Abdominal distress, anorexia, nausea, vomiting*

INTEG: Dermatitis, pruritus, toxic epidermal necrolysis, erythema multiforme

META: *Elevated uric acid, acute gout,* impaired hepatic function

MISC: Thrombocytopenia, joint pain, anaphylaxis

PHARMACOKINETICS

Peak 2-4 hr, half-life 3 hr, metabolized in liver, excreted in urine (unchanged product/inactive metabolites, unchanged product in feces)

INTERACTIONS

- Delayed absorption of ethambutol aluminum salts, separate by 4 hr
- Neurotoxicity: other neurotoxics

NURSING CONSIDERATIONS

Assess:

- Hepatic studies weekly × 2 wk then q2mo: ALT, AST, bilirubin; decreased appetite, jaundice, dark urine, fatigue
- Signs of anemia: Hct, Hgb, fatigue
- Mental status often: affect, mood, behavioral changes; psychosis may occur
- C&S, including sputum, before treatment
- Visual status: decreased activity, altered color perception
- **Serious skin reactions:** toxic epidermal necrolysis

Evaluate:

- Therapeutic response: decreased symptoms of TB, decrease in acid-fast bacteria

Teach patient/family:

- To avoid alcohol products
- That compliance with dosage schedule, duration is necessary
- That scheduled appointments must be kept or relapse may occur
- To report to prescriber any visual changes; rash; hot, swollen, painful joints; numbness, tingling of extremities

etodolac

(ee-toe'doe-lak)

Lodine, Lodine XL

Func. class.: Nonsteroidal antiinflammatory/nonopioid analgesic

Do not confuse: Lodine/codeine/iodine

ACTION: Inhibits prostaglandin synthesis by decreasing an enzyme needed for biosynthesis; analgesic, antiinflammatory

USES: Mild to moderate pain, osteoarthritis

CONTRAINDICATIONS: Hypersensitivity; patients in whom aspirin, iodides, or NSAIDs have produced asthma; rhinitis, urticaria, nasal polyps, angioedema, bronchospasm

Black Box Warning: Coronary artery bypass graft surgery (CABG)

Precautions: Edema, renal/hepatic disease, children, GI ulcers, geriatric patients

DOSAGE AND ROUTES

Osteoarthritis

• **Adult: PO** 800-1200 mg/day in divided doses every 6-8 hr initially, then adjust dosage to 600-1200 mg/day in divided doses; do not exceed 1200 mg/day; patients <60 kg not to exceed 20 mg/kg; ext rel 400-1200 mg q day

Analgesia

• **Adult: PO** 200-400 mg every 6-8 hr prn for acute pain; do not exceed 1200 mg/day; patients <60 kg, not to exceed 20 mg/kg

Available forms: Caps 200, 300 mg; tabs 400, 500 mg; ext rel 400, 500, 600 mg

Administer:

• Without regard to food
• Store at room temperature

SIDE EFFECTS

CNS: Dizziness, headache, drowsiness, fatigue, tremors, confusion, insomnia, anxiety, depression, lightheadedness, vertigo

CV: Tachycardia, peripheral edema, fluid retention, palpitations, dysrhythmias, CHF

EENT: Tinnitus, hearing loss, blurred vision, photophobia

GI: Nausea, anorexia, vomiting, diarrhea, jaundice, cholestatic hepatitis, constipation, flatulence, cramps, dry mouth, peptic ulcer, dyspepsia, GI bleeding

GU: Nephrotoxicity: dysuria, hematuria, oliguria, azotemia, cystititus, urinary tract infection

HEMA: Blood dyscrasias

INTEG: Erythema, urticaria, purpura, rash, pruritus, sweating, Stevens–Johnson syndrome

SYST: Angioedema, anaphylaxis

PHARMACOKINETICS

Peak 1½-2 hr, serum protein binding >99%, half-life 7 hr; metabolized by liver (metabolites excreted in urine)

INTERACTIONS

Increase: toxicity—cycloSPORINE, digoxin, lithium, methotrexate, phenytoin
Increase: GI toxicity—aspirin
Decrease: effect of—etodolac: antacids
Decrease: effect of—beta blockers, diuretics

NURSING CONSIDERATIONS

Assess:

• **Pain:** location, frequency, characteristics; relief after medication
• Blood, renal, liver tests: BUN, creatinine, AST, ALT, Hgb, before treatment, periodically thereafter
• For GI bleeding: black stools, hematemesis
• Audiometric, ophthalmic examination before, during, after treatment
• For eye, ear problems: blurred vision, tinnitus; can indicate toxicity
• For asthma, aspirin hypersensitivity, nasal polyps that may be hypersensitive to etodolac

Evaluate:

• Therapeutic response: decreased pain, stiffness, swelling in joints, ability to move more easily

Teach patient/family:

• To report blurred vision or ringing, roaring in the ears; might indicate toxicity
• Not to break, crush, or chew ext rel tabs
• To report change in urine pattern, weight increase, edema, pain increase in joints, fever, blood in urine; indicates nephrotoxicity
• That therapeutic effects can take up to 1 mo

E

• To avoid aspirin, NSAIDs, acetaminophen, alcoholic beverages while taking this medication

RARELY USED

etomidate (Rx)

(e-tom'i-date)

Amidate

Func. class.: General anesthetic

USES: Induction of general anesthesia

CONTRAINDICATIONS: Hypersensitivity, labor/delivery

DOSAGE AND ROUTES

• **Adult/child >10 yr: IV** 0.2-0.6 mg/kg over $^1/_2$-1 min

⚠ HIGH ALERT

etoposide (Rx)

(e-toe-poe'side)

Toposar

etoposide phosphate (Rx)

Etopophos

Func. class.: Antineoplastic—miscellaneous

Chem. class.: Semisynthetic podophyllotoxin

ACTION: Inhibits cells from entering mitosis, depresses DNA/RNA synthesis, cell-cycle–specific S and G_2; binds to a complex of DNA and topoisomerase II leading to DNA strand breaks

USES: Testicular cancer

Unlabeled uses: Leukemias (ALL, AML), desmoid tumor, gastric/ovarian cancer, bone marrow ablation, Hodgkin's/non-Hodgkin's lymphoma, malignant glioma, neuroblastoma, stem cell transplant preparation, trophoblastic disease

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, hypersensitivity

Precautions: Children, renal/hepatic disease, gout

Black Box Warning: Bone marrow depression, infection, bleeding, requires an experienced clinician

DOSAGE AND ROUTES

Testicular cancer

• **Adult: IV** 100 mg/m²/day on days 1, 2 in combination with methotrexate, leucovorin, actinomycin D, cyclophosphamide and vinCRIStine (EMA-CO regimen) q2-3wk or 1-5 with bleomycin, CISplatin (BEP regimen) or 100 mg/m²/day on days 1, 3, 5, repeat q3-4wk

Renal dose

• **Adult: IV** CCr 45-60 ml/min, reduce dose by 15%; CCr 30-44 ml/min, reduce dose by 20%; CCr <30 ml/min, reduce dose by 25%

Hepatic dose

• **Adult: IV/PO** total bilirubin 1.5-3 mg/dl reduce dose by 50% total bilirubin 3-5 mg/dl: reduce dose by 75%; total bilirubin >5 mg/dl: hold

Available forms: Inj 20 mg/ml; caps 50 mg

Administer:

• Antiemetic 30-60 min before product and prn to prevent vomiting

• **Urate nephropathy:** Allopurinol, aggressive alkalinization to maintain uric acid levels

• Antispasmodic, EPINEPHrine, corticosteroids, antihistamines for reactions

PO route

• Give without regard to food

IV route

• Do not use acrylic or ABS plastic devices; may crack, leak

Intermittent IV INF route (etoposide)

• Use cytotoxic handling procedures, use Luer-Lok fittings to prevent leakage

• After **diluting** 5-ml vial with 100 mg/250 ml or more D_5W or NaCl to 0.2-0.4 mg/ml, **infuse** over 30-60 min

Additive compatibilities: CARBOplatin, cytarabine, floxuridine, fluorouracil, hydrOXYzine, ifosfamide, ondansetron

Y-site compatibilities: Acyclovir, alfentanil, allopurinol, amifostine, amikacin, aminocaproic acid, aminophylline, amiodarone, amphotericin B colloidal, amphotericin B lipid complex, amphotericin B liposome, ampicillin, ampicillin-sulbactam, anidulafungin, atenolol, atracurium, aztreonam, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, caspofungin, ceFAZolin, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, ceftAZidime, ceftizoxime, ceftRIAXone, cefuroxime, chloramphenicol, chlorproMAZINE, cimetidine, ciprofloxacin, cisatracurium, CISplatin, cladribine, clindamycin, codeine, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, DAUNOrubicin, dexamethasone, dexmedetomidine, dexrazoxane, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, doxacurium, DOXOrubicin, DOXOrubicin liposomal, doxycycline, droperidol, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, ertapenem, erythromycin, esmolol, famotidine, fenoldopam, fentaNYL, floxuridine, fluconazole, fludarabine, fluorouracil, foscarnet, fosphenytoin, furosemide, ganciclovir, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, haloperidol, heparin, hydrALAZINE, hydrocortisone, HYDROmorphone, hydrOXYzine, ifosfamide, imipenem-cilastatin, inamrinone, insulin (regular), irinotecan, isoproterenol, ketorolac, labetalol, lansoprazole, leucovorin, levofloxacin, levorphanol, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, melphalan, meperidine, meropenem, mesna, methohexital, methotrexate, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, micafungin, midazolam, milrinone, minocycline, mitoXANtrone, mivacurium, morphine, nafcillin, nalbuphine, naloxone, nesiritide, nitroglycerin, nitroprusside, norepinephrine, NS, octreotide, ofloxacin, ondansetron, oxaliplatin, PACLitaxel, palonosetron, pamidronate, pancuronium, PEMEtrexed, pentamidine, pentazocine, PENTobarbital, PHENobarbital, phenylephrine, piperacillin, piperacillin-tazobactam, polymyxin B, potassium chloride/phosphates, procainamide, prochlorperazine, promethazine, propranolol, quinupristin-dalfopristin, ranitidine, remifentanil, rocuronium, sargramostim, sodium acetate/bicarbonate/phosphates, succinylcholine, SUFentanil, sulfamethoxazole-trimethoprim, tacrolimus, teniposide, theophylline, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, tobramycin, topotecan, trimethobenzamide, vancomycin, vasopressin, vecuronium, verapamil, vinBLAStine, vinCRIStine, vinorelbine, voriconazole, zidovudine, zoledronic acid

Intermittent IV INF route (etoposide phosphate)

- **Reconstitute** each vial with 5 or 10 ml of D_5W, 0.9% NaCl for a concentration of 20 mg/ml or 10 mg/ml, respectively; may give diluted or undiluted to concentration of as little as 0.1 mg/ml, **give** over 5-210 min

Y-site compatibilities: Acyclovir, alfentanil, amifostine, amikacin, aminocaproic acid, aminophylline, amiodarone, ampicillin, ampicillin-sulbactam, anidulafungin, atenolol, atracurium, aztreonam, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium acetate/chloride/gluconate, CARBOplatin, carmustine, caspofungin, ceFAZolin, cefonicid, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, ceftAZidime, ceftizoxime, ceftRIAXone, cefuroxime, chloramphenicol, cimetidine, ciprofloxacin, cisatracurium, CISplatin, clindamycin, codeine, cyclophosphamide, cycloSPORINE, cytarabine, dacarbazine, DACTINomycin, DAPTOmycin, DAUNOrubicin, dexamethasone, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, doripenem, doxacurium, DOXOrubicin, HCL/

liposome, doxycycline, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, ertapenem, erythromycin, esmolol, famotidine, fenoldopam, fentaNYL, floxuridine, fluconazole, fludarabine, fluorouracil, foscarnet, fosphenytoin, furosemide, ganciclovir, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, haloperidol, heparin, hydrALAZINE, hydrocortisone, HYDROmorphone, hydrOXYzine, IDArubicin, ifosfamide, inamrinone, insulin (regular), irinotecan, isoproterenol, ketorolac, labetalol, leucovorin, levofloxacin, levorphanol, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, meperidine, meropenem, mesna, metaraminol, methotrexate, methyldopate, metoclopramide, metoprolol, metroNIDAZOLE, midazolam, milrinone, minocycline, mitoXANtrone, mivacurium, morphine, nafcillin, nalbuphine, naloxone, nesiritide, netilmicin, nitroglycerin, nitroprusside, norepinephrine, octreotide, ofloxacin, ondansetron, oxaliplatin, PACLitaxel, palonosetron, pamidronate, pancuronium, PEMEtrexed, pentamidine, pentazocine, PENTobarbital, PHENobarbital, phenylephrine, piperacillin, piperacillin-tazobactam, plicamycin, polymyxin B, potassium chloride/phosphates, procainamide, promethazine, propranolol, quiNIDine, quinupristin-dalfopristin, ranitidine, remifentanil, riTUXimab, rocuronium, sodium acetate/bicarbonate/phosphates, streptozocin, succinylcholine, SUFentanil, sulfamethoxazole-trimethoprim, tacrolimus, teniposide, theophylline, thiopental, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, tobramycin, tolazoline, trastuzumab, trimethobenzamide, vancomycin, vasopressin, vecuronium, verapamil, vinBLAStine, vinCRIStine, vinorelbine, voriconazole, zidovudine, zoledronic acid

SIDE EFFECTS

CNS: Headache, *fever,* peripheral neuropathy, paresthesias, confusion, chills, fever

CV: *Hypotension,* MI, dysrhythmias

GI: *Nausea, vomiting, anorexia,* hepatotoxicity, dyspepsia, diarrhea, constipation

GU: Nephrotoxicity

HEMA: Thrombocytopenia, leukopenia, myelosuppression, anemia

INTEG: *Rash, alopecia,* phlebitis at IV site, Stevens-Johnson syndrome

RESP: Bronchospasm

SYST: Anaphylaxis, secondary malignancy

PHARMACOKINETICS

Half-life 7 hr, metabolized in liver, excreted in urine, feces, crosses placental barrier, protein binding 95%

INTERACTIONS

Increase: bone marrow depression—other antineoplastics, radiation, immunosuppressives

Increase: adverse reactions—live virus vaccines, toxoids

Increase: effect of etoposide, toxicity—voriconazole, conivaptan, cycloSPORINE, imatinib, nilotinib, etravirine, telithromycin

Increase: risk of bleeding—anticoagulants, NSAIDs, platelet inhibitors, thrombolytics, salicylate

Decrease: etoposide effect—sargramostim, filgrastim, separate by ≥24 hr

Drug/Food

- Decreased oral etoposide—grapefruit juice

Drug/Lab Test

Decrease: platelets, RBC, WBC, neutrophils, Hgb, calcium, phosphate

Increase: uric acid, potassium

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Bone marrow depression: CBC, differential, platelet count weekly; withhold product if WBC is <500 or platelet count is <50,000; notify prescriber, treatment should be delayed

- **Nephrotoxicity:** BUN; serum uric acid; urine CCr; electrolytes before, during therapy; I&O ratio; report fall in urine

output to <30 ml/hr; check B/P bid, report any significant decrease

Black Box Warning: Infection: Monitor temp; fever may indicate beginning infection, treat active infection before treatment

Black Box Warning: Infection: Hepatic studies before, during therapy (bilirubin, AST, ALT, LDH) as needed or monthly

Black Box Warning: Bleeding: hematuria, guaiac stools, bruising or petechiae, mucosa or orifices q8hr

• Effects of alopecia on body image; discuss feelings about body changes

• **Hepatotoxicity:** Jaundice of skin and sclera, dark urine, clay-colored stools, itchy skin, abdominal pain, fever, diarrhea

• B/P q15min during inf; if systolic reading <90 mm Hg, discontinue inf, notify prescriber

• Buccal cavity q8hr for dryness, sores or ulceration, white patches, oral pain, bleeding, dysphagia

• **Injection site reaction:** monitor site closely for infiltration

• Local irritation, pain, burning, discoloration at inj site

Symptoms indicating severe allergic reaction: rash, pruritus, urticaria, purpuric skin lesions, itching, flushing, restlessness, coughing, difficulty breathing

• **Frequency of stools, characteristics:** cramping, acidosis; **signs of dehydration:** rapid respirations, poor skin turgor, decreased urine output, dry skin, restlessness, weakness

• **Geriatric patients:** increased alopecia, GI effects, infection, nephrotoxicity, myelosuppression

Perform/provide:

Black Box Warning: An experienced clinician knowledgable in the use of cytotoxic products

• Increased fluid intake to 2-3 L/day to prevent urate deposits, calculi formation

• Refrigerate oral product, do not freeze

Evaluate:

• Therapeutic response: decreased tumor size, spread of malignancy

Teach patient/family:

• To report any changes in breathing or coughing

• That hair may be lost during treatment; that a wig or hairpiece may make patient feel better; that new hair may be different in color, texture

• That metallic taste may occur

Black Box Warning: Infection: To report symptoms of infection (fever, sore throat); to avoid crowds, persons with known infections

• To avoid immunizations

• **Pregnancy:** To notify prescriber if pregnancy is planned or suspected pregnancy (D); to use reliable contraception during and for several months after therapy; to avoid breastfeeding

• To take as prescribed (PO), not to double dose

• To report signs of infection (flu-like symptoms, fever, fatigue, sore throat)

• To take B/P often, hypotension occurs

etravirine (Rx)

(e-tra'veer-een)

INTELENCE

Func. class.: Antiretroviral

Chem. class.: Nonnucleoside reverse transcriptase inhibitor (NNRTI)

ACTION: Binds directly to reverse transcriptase, thus blocking the RNA- and DNA-dependent DNA polymerase action and causing a disruption of the enzyme's catalytic site

USES: In combination with other antiretroviral agents for HIV infection in treatment-experienced patients with evidence of HIV replication despite ongoing antiretroviral therapy

CONTRAINDICATIONS: Breastfeeding, hypersensitivity

Precautions: Pregnancy (B), children, geriatric patients, impaired hepatic function, antimicrobial resistance, hepatitis,

hypercholesterolemia, hypertriglycerides, immune reconstitution syndrome

DOSAGE AND ROUTES

• **Adult: PO** 200 mg bid after a meal, max 400 mg/day; not established for treatment-naive patients

Available forms: Tabs 100, 200 mg

Administer:

• In combination with other antiretrovirals with food or after a meal

• Tabs may be dispersed in water; once dispersed, stir well, give immediately, rinse glass, have patient drink to ensure all medication taken

SIDE EFFECTS

CNS: *Headache, insomnia,* amnesia, anxiety, confusion, fatigue, nightmares, peripheral neuropathy, seizures, stroke, tremor

CV: Atrial fibrillation, hypertension, MI

EENT: Blurred vision

GI: *Nausea, vomiting, diarrhea, anorexia,* abdominal pain, increased AST/ALT, constipation, flatulence, gastritis, GERD, hematemesis, hepatitis, hepatomegaly, pancreatitis

GU: Renal failure

HEMA: Hemolytic anemia, neutropenia, thrombocytopenia, anemia

INTEG: *Rash,* erythema multiforme, angioedema, Stevens-Johnson syndrome

MS: Rhabdomyolysis

OTHER: Diabetes mellitus, gynecomastia, hyperamylasemia, hypercholesterolemia, hyperglycemia, hyperlipidemia

RESP: Dyspnea, bronchospasm

PHARMACOKINETICS

99.9% plasma protein binding; metabolized by CYP3A4, 2C9, 2C19; half-life 21-61 hr; excreted in feces

INTERACTIONS

• Do not use concurrently with atazanavir, carBAMazepine, delavirdine, fosamprenavir, fosphenytoin, phenytoin, PHENobarbital, rifapentine, rifampin, tipranavir, rilpivirine

• Altered effect of cycloSPORINE, tacrolimus, sirolimus

Increase: myopathy, rhabdomyolysis—HMG-CoA reductase inhibitors

Increase: etravirine levels—CYP3A4 inhibitors (fluconazole, itraconazole, ketoconazole, lopinavir, posaconazole, ritonavir, voriconazole)

Increase: withdrawal symptoms—methadone

Increase: levels of diazepam, rifampin voriconazole, warfarin

Decrease: levels of CYP3A4 inducers (amiodarone, atazanavir, clarithromycin flecainide, fosamprenavir, lidocaine mexiletine, propafenone, quiNIDine sildenafil, tadalafil, vardenafil)

Decrease: etravirine levels—darunavir, dexamethasone, disopyramide, efavirenz, nevirapine, ritonavir, saquinavir, tiprana-vir

Drug/Herb

Decrease: etravirine—St. John's wort

NURSING CONSIDERATIONS

Assess:

• **Symptoms of HIV, possible infections;** increased temp

⚠ **Fatal hypersensitivity reactions:** fever, rash, nausea, vomiting, fatigue, cough, dyspnea, diarrhea, abdominal discomfort; treatment should be discontinued and not restarted

• **Blood dyscrasias** (anemia, granulocytopenia): bruising, fatigue, bleeding, poor healing

• **Renal failure:** BUN, serum uric acid, CCr before, during therapy; may be elevated throughout treatment

• **Hepatitis/pancreatitis:** hepatic studies before and during therapy: bilirubin, AST, ALT, amylase, alk phos, creatine phosphokinase, creatinine, monthly

• HIV: monitor viral load, CD4 counts, plasma HIV RNA during treatment; watch for decreasing granulocytes, Hgb; if low, therapy may have to be discontinued and restarted after hematologic recovery; blood transfusions may be required; cholesterol/lipid profile

Perform/provide:
• Storage in cool environment; protect from light
Evaluate:
• Therapeutic response: increased CD4 count, decreased viral load
Teach patient/family:
• That product is not a cure but will control symptoms; that patient is still infective, may pass AIDS virus to others
• To notify prescriber of sore throat, swollen lymph nodes, malaise, fever; other infections may occur; to stop product and notify prescriber immediately if skin rash, fever, cough, SOB, GI symptoms occur; to advise all health care providers that allergic reaction has occurred with etravirine
• That follow-up visits must be continued, since serious toxicity may occur; blood counts must be performed
• To use contraception during treatment; that patient still able to transmit disease
• About information on medication guide and warning card; discuss points on guide
• That other products may be necessary to prevent other infections
• To take medication after a meal

everolimus (Rx)

(e-ve-ro'li-mus)

Afinitor, Afinitor Disperz, Zortress

Func. class.: Antineoplastic—miscellaneous

Chem. class.: Immunosuppressant, macrolide

Do not confuse:
everolimus/sirolimus/tacrolimus/temsirolimus

ACTION: Proliferation signal inhibitor that inhibits mammalian target of rapamycin (mTOR); this pathway is dysregulated in cancer

USES: Renal cell cancer in those with failed treatment with sorafenib or SUNItinib kidney transplant rejection prophylaxis with cycloSPORINE, subependymal giant cell astrocytoma, progressive pancreatic neuroendocrine tumor (PNET) with unresectable locally advanced/metastatic disease, breast cancer hormone receptor positive/HER-2 negative, renal angiomyolipoma, tuberous sclerosis complex

CONTRAINDICATIONS: Breastfeeding; hypersensitivity to this product, Rapamune, torisel, pregnancy (D)
Precautions: Children, renal/hepatic disease; diabetes mellitus, hyperlipidemia, plural effusion

Black Box Warning: Immunosuppression, infection, renal artery thrombosis, renal impairment, renal vein thrombosis

DOSAGE AND ROUTES

Kidney transplant rejection prophylaxis (Zortress)
• **Adult: PO** 0.75 mg q12hr with cycloSPORINE in combination with basiliximab, corticosteroids, reduced doses of cycloSPORINE
Advanced renal cancer (Afinitor)
• **Adult: PO** 10 mg daily as long as clinically beneficial; with strong 3A4 inducers 10 mg daily then may increase by 5 mg increments to 20 mg daily
Progressive neuroendocrine tumor (PNET) (Afinitor only)
• **Adult: PO** 10 mg daily, reduce dose to 5 mg daily if intolerable adverse reactions occur
Subependymal giant-cell astrocytoma (SEGA) (Afinitor only)
• **Adult/adolescent/child:** 4.5 mg/m^2 q day, then titrate to a target trough of 5-15 ng/ml
Hepatic dose
• **Adult: PO** (Child-Pugh A): Afinitor 7.5 mg/day; (Child-Pugh B) Afinitor: 5 mg/day; Zortress: 0.75 mg/day divided q12hr; (Child-Pugh C) Afinitor 2.5 mg/day
Available forms: Tabs 0.25, 0.5, 0.75 (Zortess); 2.5, 5, 7.5, 10 mg (Afinitor)
Administer:
• Follow procedure for proper handling of antineoplastics

- Swallow tabs whole with a full glass of water; do not chew, crush, or break
- **Afinitor:** take at same time of day; if unable to swallow, consistently with or without food, disperse in 30 ml of water
- **Zortress:** must take consistently with/without food, give at same time of day q12hr with cycloSPORINE
- Store protected from light at room temp

Afinitor adjustments for toxicity

Noninfectious pneumonitis

- Grade 1, asymptomatic with radiographic findings only: No dosage change
- Grade 2, symptomatic but no interference with activities of daily living (ADL): Consider withholding therapy, resume Afinitor at a lower dosage when symptoms improve to ≤ grade 1; discontinue Afinitor if symptoms do not improve within 4 wk
- Grade 3, symptomatic and interfering with ADL and oxygen therapy indicated: hold therapy. Consider resuming Afinitor at a lower dosage when symptoms improve to ≤ grade 1. Consider discontinuing Afinitor if grade 3 toxicity recurs
- Grade 4, life-threatening and ventilator support indicated: discontinue therapy

Stomatitis

- Grade 1, minimum symptoms and normal diet: No dosage adjustment required
- Grade 2, symptomatic but can eat and swallow modified diet: Hold therapy until symptoms improve to ≤ grade 1 and resume Afinitor at the same dosage. If grade 2 toxicity recurs, hold therapy and resume Afinitor at a lower dosage when symptoms improve to ≤ grade 1
- Grade 3, symptomatic and unable to adequately eat or hydrate orally: Hold therapy. Resume Afinitor at a lower dosage when symptoms improve to ≤ grade 1
- Grade 4, symptomatic and life-threatening: discontinue therapy

Other nonhematologic toxicity (excluding metabolic events)

- **Grade 1:** No dosage adjustment required if toxicity is tolerable
- **Grade 2:** No dosage adjustment required if toxicity is tolerable. If toxicity is intolerable, hold therapy until symptoms improve to ≤ grade 1 and resume Afinitor at the same dosage. If grade 2 toxicity recurs, hold therapy and resume Afinitor at a lower dosage when symptoms improve to ≤ grade 1
- **Grade 3:** Hold therapy. Consider resuming Afinitor at a lower dosage when symptoms improve to ≤ grade 1. If grade 3 toxicity recurs, consider discontinuing therapy
- **Grade 4:** Discontinue Afinitor therapy

Metabolic events (hyperglycemia, dyslipidemia)

- **Grade 1 or 2:** No dose adjustment required
- **Grade 3:** Temporarily withhold therapy. Resume Afinitor at a lower dosage
- **Grade 4:** Discontinue Afinitor therapy

SIDE EFFECTS

CNS: *Headache, insomnia, paresthesia,* chills, fever, seizure/personality changes/dizziness

CV: *Hypertension, CHF, peripheral edema*

EENT: Blurred vision, photophobia

GI: Nausea, vomiting, diarrhea, constipation, stomatitis

GU: Renal failure

HEMA: Anemia, leukopenia, thrombocytopenia

INTEG: *Rash, acne*

META: Hyperglycemia, increased creatinine, *hyperlipemia,* hypophosphatemia, weight loss

RESP: Pleural effusion, *dyspnea,* noninfectious pneumonitis, pulmonary embolism

PHARMACOKINETICS

Rapidly absorbed; peak 1-2 hr; protein binding 74%; extensively metabolized by CYP3A4 enzyme system; half-life 30 hr; reduced by high-fat meal; excreted in feces (80%), urine (5%)

INTERACTIONS

Increase: Everolimus effect—CYP3A4 inhibitors (strong, moderate), antifungals, calcium channel blockers, cimetidine, danazol, erythromycin, cycloSPORINE, HIV-protease inhibitors

Decrease: blood levels of everolimus—carBAMazepine, PHENobarbital, phenytoin, rifamycin, rifapentine

Increase: nephrotoxicity—immunosuppressants

Decrease: effect of live vaccines

Drug/Herb

• St. John's wort: may decrease effect of everolimus

Drug/Food

• Alters bioavailability; use consistently with/without food; do not use with grapefruit juice

Drug/Lab Test

Increase: bilirubin, calcium, cholesterol, glucose, potassium, lipids, phosphate, triglycerides, uric acid

Decrease: calcium, glucose, potassium, magnesium, phosphate

NURSING CONSIDERATIONS

Assess:

• Lipid profile: cholesterol, triglycerides, lipid-lowering agent may be needed; blood glucose

Black Box Warning: Immunosuppression: CBC with differential during treatment monthly; if leukocytes $<3000/mm^3$ or platelets $<100,000/mm^3$, product should be discontinued or reduced; decreased hemoglobulin level may indicate bone marrow suppression

• Hepatic/renal studies: AST, ALT, amylase, bilirubin, creatinine, phosphate, and for hepatotoxicity: dark urine, jaundice, itching, light-colored stools; product should be discontinued

Black Box Warning: Infection: bacterial fungal infections can occur and are more common with combination immunosuppression therapy

• **Renal artery/vein thrombosis (Zortress):** May result in graft loss within 30 days after transplantation

• Obtain everolimus blood levels in kidney transplant, hepatic disease, CYP3A4 inducers, inhibitors

Evaluate:

• Therapeutic response

Teach patient/family:

Black Box Warning: To report fever, rash, severe diarrhea, chills, sore throat, fatigue; serious infections may occur; to report clay-colored stools, cramping (hepatotoxicity)

Black Box Warning: To avoid crowds, persons with known infections to reduce risk for infection

• **Pregnancy:** to notify prescriber if pregnancy is planned or suspected, pregnancy (D)

• To use contraception before, during, and 12 wk after product discontinued; to avoid breastfeeding

• Not to use with grapefruit juice

• To avoid live vaccines

• That product may decrease male, female fertility

• That drinking alcohol is not recommended

• To take consistently with or without food

• To report vision changes, weight gain, edema, shortness of breath

exemestane (Rx)

(ex-em'eh-stane)

Aromasin

Func. class.: Antineoplastic

Chem. class.: Aromatase inhibitor

Do not confuse:

exemestane/ezetimibe/estramustine

ACTION: Lowers serum estradiol concentrations; many breast cancers have strong estrogen receptors

USES: Advanced breast carcinoma not responsive to other therapy (postmenopausal)

CONTRAINDICATIONS: Pregnancy (X), breastfeeding, premenopausal women, hypersensitivity
Precautions: Children, geriatric patients, renal/hepatic disease

DOSAGE AND ROUTES

• **Adult: PO** 25 mg/day after meals; may need 50 mg/day if taken with a potent CYP3A4 inducer
Available forms: Tabs 25 mg
Administer:
• After meals at same time of day

SIDE EFFECTS

CNS: *Headache, depression, insomnia, anxiety, fatigue, hot flashes, diaphoresis,* dizziness
CV: Hypertension, edema
GI: *Nausea,* vomiting, diarrhea, constipation, abdominal pain, increased appetite
HEMA: *Lymphopenia*
MS: Fracture, bone loss
RESP: Cough, *dyspnea*

PHARMACOKINETICS

Half-life 24 hr; excreted in feces, urine

INTERACTIONS

Decrease: exemestane action—CYP3A4 inducers, estrogens

NURSING CONSIDERATIONS

Assess:
• B/P; hypertension may occur
• Bone mineral density, x-ray of thoracic or lumbar spine if bone changes suspected
Perform/provide:
• At room temp
Evaluate:
• Therapeutic response: decreased tumor size, spread of malignancy
Teach patient/family:
• To report any complaints, side effects to prescriber
• That hot flashes are reversible after discontinuing treatment
• To use reliable contraception (pregnancy X); not to breastfeed
• That vit D, calcium may be used for bone loss

exenatide (Rx)

(ex-en'a-tide)
Bydureon, Byetta
Func. class.: Antidiabetic
Chem. class.: Incretin mimetic

ACTION: Binds and activates known human GLP-1 receptor, mimics natural physiology for self-regulating glycemic control

USES: Type 2 diabetes mellitus given in combination with metFORMIN, a sulfonylurea, or a thiazolidinedione
Unlabeled uses: Once-weekly dosing

CONTRAINDICATIONS: Hypersensitivity
Precautions: Pregnancy (C), geriatric patients, severe renal/hepatic/GI disease, pancreatitis

DOSAGE AND ROUTES

• **Adult: SUBCUT** 5 mcg bid 1 hr before morning and evening meal; may increase to 10 mcg bid after 1 mo of therapy; ext rel SUBCUT (Bydureon) 2 mg q7days; ext rel inj 2 mg q7days
Available forms: Inj 5, 10 mcg pen; ext rel powder for susp for inj 2 mg
Administer:
SUBCUT route (regular release—Byetta)
• May be used as monotherapy or combined with other products
• SUBCUT only, do not give IV/IM
• Pen needles must be purchased separately, compatible; prime before use; in-

ject into thigh, abdomen, upper arm; rotate sites
• Product 1 hr before meals, approximately 6 hr apart; if patient is NPO, may need to hold dose to prevent hypoglycemia
• If added to insulin glargine, insulin, or detemir, a dosage reduction in these products may be required
SUBCUT route (ext rel—Bydureon)
• Use at same time of day q7days without regard to meals
• Give every 7 days (weekly); the dose can be given at any time of day without regard to meals
• Available as a single-dose tray containing a vial of 2 mg, a pre-filled syringe delivering 0.65 ml diluent, a vial connector, and two custom needles (23GX ½″) specific to this delivery system (one is a spare needle); do not substitute needles or any other components
• Inject immediately after the white to off-white powder is suspended in the diluent and transferred to the syringe
• Inject subcut into the thigh, abdomen, or upper arm, rotate sites to prevent lipodystrophy

SIDE EFFECTS

CNS: *Headache, dizziness,* feeling jittery, restlessness, weakness
ENDO: Hypoglycemia
GI: Nausea, vomiting, diarrhea, dyspepsia, anorexia, gastroesophageal reflux, weight loss, pancreatitis
SYST: Angioedema, anaphylaxis, inj site reactions

PHARMACOKINETICS

Peak 2.1 hr, elimination by glomerular filtration

INTERACTIONS

• May decrease effect of acetaminophen
• Do not use with erythromycin, metoclopramide
Increase: hypoglycemia—ACE inhibitors, disopyramide, sulfonylureas, androgens, fibric acid derivatives, alcohol
Increase: hyperglycemia—phenothiazines, corticosteroids, anabolic steroids
Decrease: action of digoxin, lovastatin, acetaminophen (elixir)
Decrease: hypoglycemia—niacin, dextrothyroxine, thiazide diuretics, triamterene, estrogens, progestins, oral contraceptives, MAOIs

NURSING CONSIDERATIONS

Assess:
• Fasting blood, glucose, A1c levels, postprandial glucose during treatment to determine diabetes control
• **Pancreatitis:** severe abdominal pain, with or without vomiting, product should be discontinued
• Renal studies: urinalysis, creatinine
• Hypo/hyperglycemic reaction that can occur soon after meals; for severe hypoglycemia, give IV $D_{50}W$ then IV dextrose solution
• Nausea, vomiting, diarrhea, ability to tolerate product, may cause dehydration
Perform/provide:
• Storage in refrigerator for unopened pen; may store at room temp after opening for up to 30 days
Evaluate:
• Therapeutic response: decrease in polyuria, polydipsia, polyphagia, clear sensorium, improving A1c, weight; absence of dizziness, stable gait
Teach patient/family:
• About the symptoms of hypo/hyperglycemia, what to do about each; to have glucagon emergency kit available; to carry a glucose source (candy, sugar cube) to treat hypoglycemia
• That product must be continued on a daily basis; about consequences of discontinuing product abruptly
• That diabetes is a lifelong illness; product will not cure disease; to carry emergency ID with prescriber and medication information
• To continue weight control, dietary restrictions, exercise, hygiene
• That regular blood glucose monitoring and A1c testing is needed

- To notify prescriber if pregnant or intending to become pregnant (X)
- About the importance of reading "Information for the Patient" and "Pen User Manual;" about self-injection
- **Pancreatitis:** If severe abdominal pain with or without vomiting occurs seek medical attention immediately
- Review injection procedure, to store product in refrigerator, room temperature after first use, discard 30 days after first use, do not freeze, protect from light (Byetta)

ezetimibe (Rx)

(ehz-eh-tim'bee)

Ezetrol ♣, Zetia

Func. class.: Antilipemic; cholesterol absorption inhibitor

ACTION: Inhibits absorption of cholesterol by the small intestine, causes reduced hepatic cholesterol stores

USES: Hypercholesterolemia, homozygous familial hypercholesterolemia (HoFH), homozygous sitosterolemia

CONTRAINDICATIONS: Hypersensitivity, severe hepatic disease
Precautions: Pregnancy (C), breastfeeding, children, hepatic disease

DOSAGE AND ROUTES

- **Adult/adolescent/child >10 yr: PO** 10 mg/day; may be given with HMG-CoA reductase inhibitor at same time; may be given with bile acid sequestrant; give ezetimibe 2 hr before or 4 hr after bile acid sequestrant

Available forms: Tabs 10 mg
Administer:
- Without regard to meals

SIDE EFFECTS

CNS: Fatigue, dizziness, headache
GI: Diarrhea, abdominal pain
MISC: Chest pain
MS: *Myalgias, arthralgias,* back pain, myopathy, rhabdomyolysis
RESP: Pharyngitis, sinusitis, cough, *URI*
SYST: Angioedema

PHARMACOKINETICS

Metabolized in small intestine, liver; excreted in feces 78%, urine 11%; peak 4-12 hr; half-life 22 hr

INTERACTIONS

Increase: action of ezetimibe—fibric acid derivatives, cycloSPORINE
Decrease: action of ezetimibe—antacids, cholestyramine
Drug/Lab Test
Increase: LFTs

NURSING CONSIDERATIONS

Assess:
- **Hypercholestrolemia:** diet history: fat content, lipid levels (triglycerides, LDL, HDL, cholesterol); LFTs at baseline, periodically during treatment
- **Myopathy/rhabdomyolysis:** increased CPK, myalgia, muscle cramps, musculoskeletal pain, lethargy, fatigue, fever; more common when combined with statins

Evaluate:
- Therapeutic response: decreased cholesterol, LDL; increased HDL

Teach patient/family:
- That compliance is needed
- That risk factors should be decreased: high-fat diet, smoking, alcohol consumption, absence of exercise
- To notify prescriber if pregnancy suspected, planned or if breastfeeding
- To notify prescriber if unexplained weakness, muscle pain present
- To notify prescriber of dietary/herbal supplements

ezogabine

(e-zog'a-been)

Potiga

Func. class.: Anticonvulsant

ACTION: The exact mechanism of anticonvulsant effects is not fully known. However, studies indicate that the drug enhances transmembrane potassium currents, which may stabilize the resting membrane potential and reduce brain excitability. May also augment GABA-mediated currents.

USES: Partial seizures, migraines

CONTRAINDICATIONS: Hypersensitivity

Precautions: Suicidal ideation/behavior, prostatic hypertrophy, dementia, psychotic disorders, QT prolongation, congestive heart failure, ventricular hypertrophy, hypokalemia, hypomagnesemia, abrupt discontinuation, renal impairment, hepatic disease, geriatrics pregnancy category C, breastfeeding, neonates, infants, children, adolescents

DOSAGE AND ROUTES

- **Adult/geriatric patient ≤65 years of age: PO** Initially, 100 mg tid, increase by ≤ 50 mg tid per day at weekly intervals depending on response, up to a maintenance dose of 200-400 mg tid depending on response; max is 400 mg tid (1200 mg/day).
- **Geriatric patient > 65 years of age: PO** initially, 50 mg tid, increase by ≤ 50 mg tid per day at weekly intervals depending on response; max 250 mg tid (750 mg/day).

Available forms: Film-coated tabs 50, 200, 300, 400 mg

Administer:

- Tab should be swallowed whole without regard to meals
- Give in 3 equally divided doses

SIDE EFFECTS

CNS: Dizziness, drowsiness, memory impairment, tremor, vertigo, abnormal coordination, disturbance in attention, gait disturbance, aphasia, dysarthria, balance disorder, paresthesias, amnesia, dysphagia, myoclonia, hypokinesia, confusion, anxiety, hallucinations, **suicidal thoughts/behaviors**, fatigue, asthenia, malaise

EENT: Diplopia, blurred vision

GU: Urinary retention, hydronephrosis, dysuria, urinary hesitation, hematuria, chromaturia

GI: Nausea, constipation, dyspepsia, xerostomia, constipation, weight gain, appetite stimulation

MISC: Influenza, dyspnea, **QT prolongation**

MS: Muscle spasms, weakness

PHARMACOKINETICS

80% protein bound; extensively distributed in the body; extensively metabolized by glucuronidation and acetylation; inactive N-glucuronides are the primary metabolites; elimination half-lives of ezogabine and its N-acetyl metabolite are 7 hr and 11 hr, respectively; 36% excreted renally as exogabine, 18% as NAMR, 24% as the N-glururonides of ezogabine and NAMR, 14% fecal excretion; rapidly absorbed, peak 0.5-2 hr, bioavailability 60%; high-fat food increases peak concentration; increased in hepatic/renal disease, geriatric patients, young adult females

INTERACTIONS:

Increase: **QT prolongation**—arsenic trioxide, chloroquine, chlorproMAZINE, mesoridazine thioridazine, clarithromycin, Class IA antiarrhythmics (disopyramide, procainamide, quiNIDine), Class III antiarrhythmics (amiodarone, dofetilide, ibutilide, sotalol), dextromethorphan, dronedarone, droperidol, erythromycin, grepafloxacin, halofantrine, levomethadyl, methadone, pentamidine, pimozide, posaconazole, probucol, propafenone,

quiNIDine, saquinavir, sparfloxacin, terfenadine, troleandomycin, ziprasidone
Decrease: effect of phenytoin
Decrease: effect of ezogabine—carBAMazepine
Increase: effect of digoxin
Increase: urinary retention—antimuscarinics, amantadine, H1-blockers
Increase: CNS depression—anxiolytics, sedatives, hypnotics, buprenorphine, butorphanol, dronabinol, mirtazapine, nabilone, nalbuphine, opiate agonists, pentazocine, pregabalin, skeletal muscle relaxants, traMADol, traZODone, ethanol

NURSING CONSIDERATIONS

Assess:
⚠ **Seizures:** Assess for type, duration, location, activity, presence of aura
⚠ **QT prolongation:** Monitor in those with known QT prolongation, congestive heart failure, ventricular hypertrophy, hypokalemia, hypomagnesemia, and in patients receiving medications known to cause QT prolongation. QT prolongation can occur within 3 hr of dose
⚠ **Abrupt withdrawal:** Withdraw gradually to minimize increased seizure frequency
⚠ **Suicidal thoughts/behaviors:** Assess for any unusual changes in moods or behaviors, including emotional lability or emerging or worsening depression and suicidal ideation

Teach patient/family:
- To avoid driving or operating machinery or performing other tasks that require mental alertness until reaction is known
- To avoid concurrent use of alcohol
- To avoid abruptly discontinuing this product

⚠ **Suicidal thought/behaviors:** Advise patient to notify prescriber immediately of suicidal thought/behaviors

⚠ HIGH ALERT

factor IX complex (human) (Rx)

AlphaNine SD, Bebulin, BeneFIX, Mononine, Profilnine SD
Func. class.: Hemostatic
Chem. class.: Factors II, VII, IX, X

ACTION: Causes an increase in blood levels of clotting factors II, VII, IX, X; factor IX (human) has IX activity

USES: Hemophilia B (Christmas disease), factor IX deficiency, anticoagulant reversal, control of bleeding in patients with factor VIII inhibitors, reversal of overdose of anticoagulants in emergencies

CONTRAINDICATIONS: Hypersensitivity to mouse or hamster protein, DIC, mild factor IX deficiency
Precautions: Pregnancy (C), neonates/infants, hepatic disease, elective surgery

DOSAGE AND ROUTES

Factor IX complex (human) bleeding in hemophilia B
- **Adult and child: IV** establish 25% of normal factor IX or 60-75 units/kg then 10-20 units/kg/day 1-2×/wk

Prophylaxis for bleeding in hemophilia B (long term)
- **Adult and child: IV** 25-40 units/kg 2×/wk

Bleeding in hemophilia A/inhibitors of factor VIII (Proplex T, Konyne 80)
- **Adult and child: IV** 75 units/kg, repeat after 12 hr

Oral anticoagulant reversal (Factor IX complexer only) (unlabeled)
- **Adult and child: IV** 20-50 units/kg

Factor VII deficiency (use Proplex T only)
- **Adult and child: IV** 0.5 units/kg × weight (kg) × desired factor IX increase (% of normal); repeat q4-6hr if needed

Factor IX (human) minor to moderate hemorrhage
Use only Alpha-Nine, Alpha-Nine SD
• **Adult and child: IV** dose to increase factor IX level to 20%-30% in one dose
Serious hemorrhage
• **Adult and child: IV** dose to increase factor IX to 30%-50% as daily inf
Minor hemorrhage (mononine only)
• **Adult and child: IV** dose to increase factor IX to 15%-25% (20-30 units/kg), repeat after 24 hr if needed
Major hemorrhage
• **Adult and child: IV** dose to increase factor IX to 25%-50% (75 units/kg) q18-30hr × ≤10 days
Available forms: Inj (number of units noted on label)
Administer:
• Hepatitis B vaccine before administration
• IV after warming to room temp ≤3 ml/min, with plastic syringe only; do not admix
• After dilution with provided diluent, 50 units/ml or 25 units/ml; do not exceed 10 ml/min; decrease rate if fever, headache, flushing, tingling occur
• After cross-matching if patient has blood type A, B, AB to determine incompatibility with factor

BeneFIX
• Allow vials of concentrate/diluent to warm to room temp
• After removing flip-top cap from vial, wipe top of vial with alcohol swab; allow to dry
• Peel back cover from vial adapter package; do not remove
• Place vial adapter over vial; press firmly until it snaps; attach plunger rod to diluent syringe and break plastic tip cap from diluent syringe
• Lift package away from adapter and connect diluent syringe; depress plunger; swirl contents

SIDE EFFECTS

CNS: Headache, dizziness, malaise, paresthesia, *lethargy, chills, fever, flushing*
CV: *Hypotension,* tachycardia, *MI,* venous thrombosis, pulmonary embolism
GI: Nausea, vomiting, abdominal cramps, jaundice, viral hepatitis
HEMA: Thrombosis, hemolysis, AIDS, DIC
INTEG: Rash, flushing, *urticaria,* inj site reactions
RESP: Bronchospasm

PHARMACOKINETICS

IV: Half-life factor IX: 22 hr; rapidly cleared from plasma

INTERACTIONS

• Incompatible with protein products
⚠ **Increase:** thrombosis risk—aminocaproic acid; do not administer
Decrease: effect of warfarin

NURSING CONSIDERATIONS

Assess:
• Blood studies: coagulation factor assays by % normal: 5% prevents spontaneous hemorrhage, 30%-50% for surgery, 80%-100% for severe hemorrhage; APTT, clotting inhibitor titers, D-dimer, factor IX, VII concentration, fibrin degradation products, fibrinogen, platelets, PT, thrombin time
• Increased B/P, pulse
• For bleeding q15-30min; immobilize and apply ice to affected joints
• I&O; if urine becomes orange or red, notify prescriber
• **Allergic or pyrogenic reaction:** fever, chills, rash, itching, slow inf rate if not severe
⚠ **DIC:** bleeding, ecchymosis, hypersensitivity, changes in coagulation tests
• For tingling sensation; if present, reduce rate
Perform/provide:
• Storage of reconstituted sol for 3 hr at room temp or for ≤2 yr with refrigeration (powder); check expiration date
Evaluate:
• Therapeutic response: prevention of hemorrhage

Teach patient/family:
- To report any signs of bleeding: gums, under skin, urine, stools, emesis; calf pain, joint pain, yellowing of eyes/skin
- About the risk for viral hepatitis, AIDS; to be tested q2-3mo for HIV, although low risk
- That immunization for hepatitis B may be given first
- To carry emergency ID identifying disease; to avoid salicylates, NSAIDs; to inform other health professionals of condition

famciclovir (Rx)

(fam-cy'clo-veer)

Famvir

Func. class.: Antiviral

Chem. class.: Guanosine nucleoside

ACTION: Inhibits DNA polymerase and viral DNA synthesis by conversion of this guanosine nucleoside to penciclovir

USES: Treatment of acute herpes zoster (shingles), genital herpes; recurrent mucocutaneous herpes simplex virus (HSV) in patients with HIV; initial episodes of herpes genitalis; herpes labialis in the immunocompromised

Unlabeled uses: Bell's palsy, herpes labialis prophylaxis, postherpetic neuralgia prophylaxis

CONTRAINDICATIONS: Hypersensitivity to this product, penciclovir, acyclovir, ganciclovir, valacyclovir, valganciclovir

Precautions: Pregnancy (B), breastfeeding, renal disease

DOSAGE AND ROUTES

Herpes zoster
- **Adult: PO** 500 mg q8hr for 7 days

Renal dose
- **Adult: PO** CCr ≥60 ml/min, 500 mg q8hr; CCr 40-59 ml/min, 500 mg q12hr; CCr 20-39 ml/min, 500 mg q24hr; CCr <20 ml/min, 250 mg q24hr

Recurrent herpes simplex virus
- **Adult: PO** 125 mg q12hr × 5 days

Renal dose
- **Adult: PO** 40-59 ml/min 500 mg bid; CCr 20-39 ml/min 500 q day; CCr <20 ml/min 250 mg q day

Suppression of recurrent herpes simplex virus
- **Adult: PO** 250 mg q12hr up to 1 yr

Renal dose
- **Adult: PO** CCr 20-39 ml/min, 125 mg q12hr × 5 days; CCr <20 ml/min, 125 mg q24hr × 5 days

Genital herpes/herpes labialis (recurrent)
- **Adult: PO** 125 mg bid × 5 days or 1000 mg bid for 1 day; begin treatment at 1st sign of recurrence; immunocompetent herpes labialis 1500 mg as a single dose

Suppression of recurrent genital herpes
- **Adult: PO** 250 mg bid for up to 1 yr

Herpes genitalis initial episodes
- **Adult: PO** 250 mg tid × 7-10 days

Bell's palsy (unlabeled)
- **Adult: PO** 750 mg tid × 7 days with predniSONE

Varicella-zoster virus (shingles); chickenpox (unlabeled)
- **Adult: PO** 500 mg q8hr × 7 days, preferably within 48 hr of onset

Herpes zoster in HIV (unlabeled)
- **Adult/adolescent: PO** 500 mg tid × 7-10 days

Available forms: Tabs 125, 250, 500 mg

Administer:
- Without regard to meals
- As soon as diagnosed; for herpes zoster within 72 hr

SIDE EFFECTS

CNS: *Headache, fatigue, dizziness,* paresthesia, somnolence, fever

GI: Nausea, vomiting, diarrhea, constipation, abdominal pain, anorexia

GU: Decreased sperm count

INTEG: *Pruritus*

MS: Back pain, arthralgia

RESP: Pharyngitis, sinusitis

PHARMACOKINETICS

Bioavailability 77%, 20% protein binding, 73% excreted via kidneys, terminal plasma half-life 2-3 hr

INTERACTIONS

Decrease: renal excretion—theophylline, probenecid, digoxin
Decrease: metabolism—cimetidine

NURSING CONSIDERATIONS

Assess:
- **Herpes zoster:** number, distribution of lesions; burning, itching, pain, which are early symptoms of herpes infection; assess daily during therapy
- Renal studies: urine CCr; BUN before and during treatment if decreased renal function; dose may have to be lowered
- Bowel pattern before, during treatment; diarrhea may occur
- Postherapeutic neuralgia during and after treatment

Evaluate:
- Therapeutic response: decreased size, spread of lesions

Teach patient/family:
- How to recognize beginning infection
- How to prevent spread of infection; that this medication does not prevent spread to others; that condoms should be used
- About the reason for medication, expected results
- That women with genital herpes should have yearly Pap smears; that cervical cancer is more likely

famotidine (OTC, Rx)

(fa-moe'ti-deen)

Pepcid, Pepcid AC

Func. class.: H_2-histamine receptor antagonist

ACTION: Competitively inhibits histamine at histamine H_2-receptor site, thus decreasing gastric secretion while pepsin remains at a stable level

USES: Short-term treatment of active duodenal ulcer, maintenance therapy for duodenal ulcer, Zollinger-Ellison syndrome, multiple endocrine adenomas, gastric ulcers; gastroesophageal reflux disease, heartburn
Unlabeled uses: GI disorders in those taking NSAIDs; urticaria; prevention of stress ulcers, aspiration pneumonitis, inactivation of oral pancreatic enzymes in pancreatic disorders

CONTRAINDICATIONS: Hypersensitivity
Precautions: Pregnancy (B), breastfeeding, children <12 yr, geriatric patients, severe renal/hepatic disease

DOSAGE AND ROUTES

Active ulcer
- **Adult: PO** 40 mg/day at bedtime × 4-8 wk then 20 mg/day at bedtime if needed (maintenance); **IV** 20 mg q12hr if unable to take **PO**
- **Child 1-16 yr: PO** 0.5 mg/kg/day at bedtime or divided bid, max 40 mg/day

Hypersecretory conditions
- **Adult: PO** 20 mg q6hr; may give 160 mg q6hr if needed; **IV** 20 mg q6hr if unable to take **PO**

Heartburn relief/prevention
- **Adult: PO** 10 mg with water or 15 min-1 hr before eating

Renal disease
- **Adult: PO** CCr <50 ml/min, decrease dose by 50% or extend interval to 36-48 hr

Available forms: Tabs 10, 20, 40 mg; gel cap 10 mg; powder for oral susp 40 mg/5 ml; inj 10 mg/ml, 20 mg/50 ml; chew tabs 10 mg

Administer:

PO route
- Antacids 1 hr before or 2 hr after famotidine; may be given with foods or liquids
- After shaking oral suspension

Direct IV route
- After diluting 2 ml of product (10 mg/ml) in 0.9% NaCl to total volume of 5-10

ml; inject over 2 min to prevent hypotension

Intermittent IV INF route

• After diluting 20 mg (2 ml) of product in 100 ml of LR, 0.9% NaCl, D_5W, $D_{10}W$; run over 15-30 min

Continuous IV INF route

• *Adults:* Dilute 40 mg of product in 250 ml D_5W, NS; infuse over 24 hr, run at 11 ml/hr, use inf device

Y-site compatibilities: Acyclovir, alfentanil, allopurinol, amifostine, amikacin, aminocaproic acid, aminophylline, amiodarone, amphotericin B lipid complex, amphotericin B liposome, amsacrine, anakinra, anidulafungin, ascorbic acid injection, atenolol, atracurium, atropine, aztreonam, benztropine, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, caspofungin, cefonicid, cefotaxime, cefTAZidime, cefuroxime, chlorproMAZINE, cimetidine, cisatracurium, CISplatin, cladribine, clindamycin, codeine, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, dexmedetomidine, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, doripenem, doxacurium, DOXOrubicin, DOXOrubicin liposomal, doxycycline, droperidol, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, epoetin alfa, eptifibatide, ertapenem, erythromycin, esmolol, etoposide, fenoldopam, fentaNYL, filgrastim, fluconazole, fludarabine, fluorouracil, folic acid, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, heparin, hydrocortisone, HYDROmorphone, hydrOXYzine, IDArubicin, ifosfamide, imipenem-cilastatin, irinotecan, isoproterenol, ketorolac, labetalol, levofloxacin, lidocaine, linezolid, LORazepam, LR, magnesium sulfate, mannitol, mechlorethamine, melphalan, meperidine, metaraminol, methicillin, methotrexate, methoxamine, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, miconazole, midazolam, milrinone, mitoXANtrone, morphine, moxalactam, multiple vitamins injection, mycophenolate, nafcillin, nalbuphine, naloxone, nesiritide, netilmicin, niCARdipine, nitroglycerin, nitroprusside, norepinephrine, 0.9% NaCl, octreotide, ondansetron, oxacillin, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pamidronate, pancuronium, papaverine, PEMEtrexed, penicillin G potassium/sodium, pentamidine, pentazocine, PENTobarbital, perphenazine, PHENobarbital, phenylephrine, phytonadione, polymyxin B, potassium chloride/phosphates, procainamide, prochlorperazine, promethazine, propofol, propranolol, protamine, pyridoxine, quiNIDine, ranitidine, remifentanil, Ringer's, ritodrine, riTUXimab, sargramostim, sodium acetate/bicarbonate, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiamine, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, TNA, tobramycin, tolazoline, TPN, trastuzumab, trimetaphan, urokinase, vancomycin, vasopressin, vecuronium, verapamil, vinCRIStine, vinorelbine, voriconazole, zoledronic acid

SIDE EFFECTS

CNS: *Headache, dizziness,* paresthesia, depression, anxiety, somnolence, insomnia, fever, seizures in renal disease

CV: Dysrhythmias, QT prolongation (impaired renal functioning)

EENT: Taste change, tinnitus, orbital edema

GI: *Constipation,* nausea, vomiting, anorexia, cramps, abnormal hepatic enzymes, diarrhea

INTEG: Rash, toxic epidermal necrolysis, Stevens-Johnson syndrome

MS: Myalgia, arthralgia

RESP: Pneumonia

PHARMACOKINETICS

Plasma protein binding 15%-20%, metabolized in liver 30% (active metabo-

lites), 70% excreted by kidneys, half-life 2½-3½ hr
PO: Onset 30-60 min, duration 6-12 hr, peak 1-3 hr, absorption 50%
IV: Onset immediate, peak 30-60 min, duration 8-15 hr

INTERACTIONS

Decrease: absorption—ketoconazole, itraconazole, cefpodoxime, cefditoren
Decrease: famotidine absorption—antacids
Decrease: effect of—atazanavir, delavirdine

NURSING CONSIDERATIONS

Assess:
- **Ulcers:** epigastric pain, adominal pain, frank or occult blood in emesis, stools
- Intragastric pH, serum creatinine/BUN baseline and periodically
- For bleeding, hematuria, hematuresis, occult blood in stools; abdominal pain

Perform/provide:
- Storage in cool environment (oral); IV sol stable for 48 hr at room temp; do not use discolored sol; discard unused oral sol after 1 mo
- Increase in bulk and fluids in diet to prevent constipation

Evaluate:
- Therapeutic response: decreased abdominal pain

Teach patient/family:
- That product must be continued for prescribed time in prescribed method to be effective; not to double dose
- About possibility of decreased libido; that this is reversible after discontinuing therapy
- To avoid irritating foods, alcohol, aspirin, extreme-temp foods that may irritate GI system
- That smoking should be avoided because it diminishes effectiveness of product
- To avoid tasks requiring alertness because dizziness, drowsiness may occur

fat emulsions (Rx)

Intralipid 10%, Intralipid 20%, Liposyn II 10%, Liposyn II 20%, Liposyn III 10%, Liposyn III 20%
Func. class.: Caloric
Chem. class.: Fatty acid, long chain; nutritional supplement

F

ACTION: Needed for energy, heat production; consist of neutral triglycerides, primarily unsaturated fatty acids

USES: Increase calorie intake, fatty acid deficiency, prevention

CONTRAINDICATIONS: Hypersensitivity to this product or eggs, soybeans, legumes; hyperlipemia, lipid necrosis, acute pancreatitis accompanied by hyperlipemia, hyperbilirubinemia of the newborn; renal insufficiency, hepatic damage
Precautions: Pregnancy (C), premature/term newborns, severe hepatic disease, diabetes mellitus, thrombocytopenia, gastric ulcers, sepsis
Black Box Warning: Preterm infants

DOSAGE AND ROUTES

Deficiency
- **Adult and child: IV** 8%-10% of required calorie intake (intralipid)

Adjunct to TPN
- **Adult: IV** 1 ml/min over 15-30 min (10%) or 0.5 ml/min over 15-30 min (20%); may increase to 500 ml over 4-8 hr if no adverse reactions occur; max 2.5 g/kg
- **Child: IV** 0.1 ml/min over 10-15 min (10%) or 0.05 ml/min over 10-15 min (20%); may increase to 1 g/kg over 4 hr if no adverse reactions occur; max 4 g/kg

Prevention of deficiency
- **Adult: IV** 500 ml 2×/wk (10%), given 1 ml/min for 30 min, max 500 ml over 6 hr

• **Child: IV** 5-10 ml/kg/day (10%), given 0.1 ml/min for 30 min, max 100 ml/hr

Available forms: Inj 10% (50, 100, 200, 250, 500 ml), 20% (50, 100, 200, 250, 500 ml)

Administer:

Intermittent IV INF route

• At 10% (1 ml/min) or 20% (0.5 ml/min) initially × 15-30 min, may increase 10% (120 ml/hr) or 20% (62.5 ml/hr) if no adverse reaction; do not give more than 500 ml on 1st day

• After changing IV tubing at each inf; infection may occur with old tubing

• With inf pump at prescribed rate; do not use in-line filter sized for lipid emulsion; clogging will occur

SIDE EFFECTS

CNS: Dizziness, headache, drowsiness, focal seizures

CV: Shock

GI: Nausea, vomiting, hepatomegaly

HEMA: Hyperlipemia, hypercoagulation, thrombocytopenia, leukopenia, leukocytosis

RESP: Dyspnea, fat in lung tissue

PHARMACOKINETICS

Completely absorbed, distributed to intravascular space, converted to triglycerides then to free fatty acids

NURSING CONSIDERATIONS

Assess:

• Triglycerides, free fatty acid levels, platelet counts daily to prevent fat overload, thrombocytopenia

• Hepatic studies: AST, ALT, Hct, Hgb; notify prescriber if abnormal

• Nutritional status: calorie count by dietitian; monitor weight daily

Perform/provide:

• Do not use mixed sol if separated or oily looking

Evaluate:

• Therapeutic response: increased weight

Teach patient/family:

• About the reason for use of lipids

febuxostat (Rx)

(feb-ux'oh-stat)

Uloric

Func. class.: Antigout drug, antihyperuricemic

Chem. class.: Xanthene oxidase inhibitor

ACTION: Inhibits the enzyme xanthine oxidase, thereby reducing uric acid synthesis; more selective for xanthine oxidase than allopurinol

USES: Chronic gout, hyperuricemia

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (C), breastfeeding, children, renal/hepatic/cardiac/neoplastic disease, stroke, MI, organ transplant, Lesch-Nyhan syndrome

DOSAGE AND ROUTES

• **Adult: PO** 40 mg daily, may increase to 80 mg daily if uric acid levels are >6 mg/dl after 2 wk of therapy

Available forms: Tabs 40, 80 mg

Administer:

PO route

• Without regard to meals or antacids; may crush and add to foods or fluids

• A few days before antineoplastic therapy

SIDE EFFECTS

CNS: Weakness, flushing

CV: MI, atrial fibrillation, atrial flutter, AV block, bradycardia, hypo/hypertension, palpitations, sinus tachycardia, stroke, angina

EENT: Retinopathy, cataracts, epistaxis

GI: *Nausea, vomiting, anorexia,* constipation, diarrhea, dyspepsia, hematemesis, hepatitis, hepatomegaly, weight gain/loss, cholecystitis, cholelithiasis, melena

GU: Renal failure, urinary urgency/frequency/incontinence, nephrolithiasis, hematuria

HEMA: Thrombocytopenia, anemia, pancytopenia, leukopenia, bone marrow suppression
INTEG: Rash
MISC: Arthralgia, gout flare

PHARMACOKINETICS

Peak 1-1.5 hr; excreted in feces, urine; half-life 5-8 hr; protein binding 99.2%

INTERACTIONS

Increase: toxicity—azaTHIOprine
Increase: xanthine nephropathy, calculi—rasburicase, antineoplastics
Increase: myelosuppression—mercaptopurine, theophylline

NURSING CONSIDERATIONS

Assess:
- **Hyperuricemia:** uric acid levels q2wk; uric acid levels should be ≤6 mg/dl, flares may occur during first 6 wk of treatment
- CBC, AST, BUN, creatinine before starting treatment, periodically
- **Renal disease:** I&O ratio; increase fluids to 2 L/day to prevent stone formation and toxicity
- For rash, hypersensitivity reactions; discontinue
- **Gout:** joint pain, swelling; may use with NSAIDs for acute gouty attacks and gout flare (first 6 wk)

Evaluate:
- Therapeutic response: decreased pain in joints, decreased stone formation in kidneys, decreased uric acid levels

Teach patient/family:
- That tabs may be crushed
- To take as prescribed; if dose is missed, to take as soon as remembered; not to double dose
- To increase fluid intake to 2 L/day unless contraindicated
- To avoid alcohol, caffeine because they will increase uric acid levels
- To report cardiovascular events to prescriber immediately
- **Gout:** That flares may occur during first 6 wk of treatment

felodipine (Rx)

(fe-loe'-di-peen)
Plendil ♣, Renedil ♣
Func. class.: Antihypertensive, calcium channel blocker, antianginal
Chem. class.: Dihydropyridine

Do not confuse:
Plendil/pindolol/Pletal/PriLOSEC/Prinivil

F

ACTION: Inhibits calcium ion influx across cell membrane, resulting in the inhibition of the excitation and contraction of vascular smooth muscle

USES: Essential hypertension alone or with other antihypertensives
Unlabeled uses: Hypertension in adolescents and children, angina pectoris; Prinzmetal's angina (vasospastic)

CONTRAINDICATIONS: Hypersensitivity to this product or dihydropyridines, sick sinus syndrome, 2nd- or 3rd-degree heart block, hypotension <90 mm Hg systolic
Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, CHF, hepatic injury, renal disease

DOSAGE AND ROUTES

- **Adult: PO** 5 mg/day initially; usual range 2.5-10 mg/day; max 10 mg/day; do not adjust dosage at intervals of <2 wk
- **Geriatric: PO** 2.5 mg/day

Hepatic disease
- **Adult: PO** 2.5-5 mg, max 10 mg/day

Hypertension in adolescent/child (unlabeled)
- **Adolescent and child: PO** 2.5 mg initially, titrate upward, max 10 mg/day

Available forms: Ext rel tabs 2.5, 5, 10 mg

Administer:
PO route
- Swallow whole; do not break, crush, or chew ext rel products
- Once daily with light meal; avoid grapefruit juice

SIDE EFFECTS

CNS: *Headache,* fatigue, drowsiness, dizziness, anxiety, depression, nervousness, insomnia, light-headedness, paresthesia, tinnitus, psychosis, somnolence, flushing
CV: Dysrhythmia, *edema,* CHF, hypotension, palpitations, MI, pulmonary edema, tachycardia, syncope, AV block, angina
GI: Nausea, vomiting, diarrhea, gastric upset, constipation, increased LFTs, dry mouth
GU: Nocturia, polyuria
HEMA: Anemia
INTEG: Rash, pruritus
MISC: Flushing, sexual difficulties, cough, nasal congestion, SOB, wheezing, epistaxis, respiratory infection, chest pain, angioedema, gingival hyperplasia

PHARMACOKINETICS

Peak plasma levels 2.5-5 hr, highly protein bound >99%, metabolized in liver, 0.5% excreted unchanged in urine, elimination half-life 11-16 hr

INTERACTIONS

Increase: bradycardia, CHF—β-blockers, digoxin, phenytoin, disopyramide
Increase: toxicity, hypotension—nitrates, alcohol, quiNIDine, zileuton, miconazole, diltiazem, delavirdine, quinupristin, dalfopristin, conivaptan, cycloSPORINE, cimetidine, clarithromycin, antiretroviral protease inhibitors, other antihypertensives, MAOIs, ketoconazole, erythromycin, itraconazole, propranolol
Decrease: antihypertensive effects—NSAIDs, carBAMazepine, barbiturates, phenytoin

Drug/Herb

Increase: antihypertensive effect—ginseng, ginkgo, hawthorn
Decrease: antihypertensive effect—ephedra, St. John's wort

Drug/Food

Increase: felodipine level—grapefruit juice

NURSING CONSIDERATIONS

Assess:

- **CHF:** I&O, weight daily; weight gain, crackles, dyspnea, edema, jugular venous distention
- Cardiac status: B/P, pulse, respiration; ECG periodically
- **Angina pain:** location, duration, intensity; ameliorating, aggravating factors

Evaluate:

- Therapeutic response: decreased B/P, decreased anginal attacks, increased activity tolerance

Teach patient/family:

- To avoid hazardous activities until stabilized on product, dizziness no longer a problem
- To avoid OTC products, alcohol unless directed by prescriber; to limit caffeine consumption
- About the importance of complying with all areas of medical regimen: diet, exercise, stress reduction, product therapy
- That tablets may appear in stools but are insignificant
- To report dyspnea, palpitations, irregular heart beat, swelling of extremities, nausea, vomiting, severe dizziness, severe headache
- To change positions slowly to prevent orthostatic hypotension
- To obtain correct pulse; to contact prescriber if pulse <50 bpm

TREATMENT OF OVERDOSE:

Atropine for AV block, vasopressor for hypotension

fenofibrate (Rx)

(fen-oh-fee'brate)

Antara, Apo-Feno-Micro ♣, Fenoglide, Lipidil Micro ♣, Lipidil Supra Cap, Lipofen, Lofibra, Tricor, Triglide

Func. class.: Antilipemic

Chem. class.: Fibric acid derivative

ACTION: Increases lipolysis and elimination of triglyceride-rich particles from plasma by activating lipoprotein lipase, thereby resulting in changes in triglyceride size and composition of LDL, leading to rapid breakdown of LDL; mobilizes triglycerides from tissue; increases excretion of neutral sterols

USES: Hypercholesterolemia; types IV, V hyperlipidemia that do not respond to other treatment and that increase risk for pancreatitis; Fredrickson type IV, V hypertriglyceridemia

CONTRAINDICATIONS: Hypersensivity, severe renal/hepatic disease, primary biliary cirrhosis, preexisting gallbladder disease

Precautions: Pregnancy (C), breastfeeding, geriatric patients, peptic ulcer, pancreatitis, renal/hepatic disease

DOSAGE AND ROUTES

Hypertriglyceridemia

- **Adult: PO** (Antara) 43-130 mg/day; (Lofibra) 67-200 mg/day; (Tricor) 48-145 mg/day; (Triglide) 50-160 mg/day

Primary hypercholesterolemia/ mixed hyperlipidemia

- **Adult: PO** (Antara) 130 mg/day; (Lofibra) 200 mg/day; (Tricor) 145 mg/day; (Triglide) 160 mg/day

Renal dose (geriatric)

- **Adult: PO** (Tricor) CCr 30-80 ml/min, 48 mg/day; CCr <30 ml/min, contraindicated
- **Adult: PO** CCr 30-48 ml/min, 50 mg/day (Triglide, Liprofen), 43 mg/day (Antara), 67 mg/day (Lofibra caps), 54 mg/day (Lofibra tabs); CCr <10 ml/min, contraindicated (Antara, Lipofen, Lofibra, Triglide); 40 mg/day (Fenoglide)

Available forms: Tabs (Triglide) 50, 160 mg; (Tricor) 48, 145 mg; micronized cap (Antara) 43, 130 mg; (Lofibra) 67, 134, 200 mg; cap (Lipofen) 50, 100, 150 mg; tabs (Fenoglide) 40, 120 mg

Administer:

- Product with meals (Lipofen, Lofibra); Triglide without regard to food; may increase q4-8wk; brands are not interchangeable; therapy should be discontinued if there is not adequate response after 2 mo

SIDE EFFECTS

CNS: *Fatigue, weakness,* drowsiness, dizziness, insomnia, depression, vertigo

CV: Angina, hypertension

GI: *Nausea,* vomiting, dyspepsia, increased liver enzymes, flatulence, hepatomegaly, gastritis, pancreatitis, cholelithiasis

GU: Dysuria, urinary frequency

HEMA: Anemia, leukopenia, thrombosis/pulmonary embolism

INTEG: *Rash,* urticaria, pruritus, photosensitivity

MISC: Polyphagia, weight gain, infection, flulike syndrome

MS: *Myalgias, arthralgias,* myopathy, rhabdomyolysis

RESP: Pharyngitis, bronchitis, cough

PHARMACOKINETICS

Peak 6-8 hr, protein binding 99%, converted to fenofibric acid, metabolized in liver, excreted in urine (60%), feces (25%), half-life 20 hr

INTERACTIONS

Increase: myopathy—colchicine

Increase: nephrotoxicity—cycloSPORINE

- Avoid use with HMG-CoA reductase inhibitors; rhabdomyolysis may occur

Increase: anticoagulant effects—oral anticoagulants

Increase: effects of—antidiabetics

F

♣ Canada only

Decrease: absorption of fenofibrate—bile acid sequestrants
Drug/Herb
Increase: effect—red yeast rice
Drug/Food
Increase: absorption
Drug/Lab Test
Increase: ALT, AST, BUN, CK, creatinine
Decrease: WBC, uric acid, Hgb, paradoxical effect in HDL

NURSING CONSIDERATIONS

Assess:
• **Diet history:** fat content; lipid levels (triglycerides, LDL, HDL, cholesterol), may cause a paradoxical decrease in HDL, LFTs at baseline, periodically during treatment, CPK if muscle pain occurs, CBC, Hct, Hgb; PT with anticoagulant therapy
• **Pancreatitis, cholelithiasis renal failure, rhabdomyolysis** (when combined with HMG Co-A reductase inhibitors), myositis; product should be discontinued
Evaluate:
• Therapeutic response: decreased triglycerides, cholesterol levels
Teach patient/family:
• That compliance is needed
• That risk factors should be decreased: high-fat diet, smoking, alcohol consumption, absence of exercise
• To notify prescriber if pregnancy is suspected or planned
• To report GU symptoms: decreased libido, impotence, dysuria, proteinuria, oliguria, hematuria
• To notify prescriber of muscle pain, weakness, fever, fatigue, epigastric pain

⚠ HIGH ALERT

fentaNYL (Rx)

(fen'ta-nill)

ABSTRAL, Actiq, Fentora, Onsolis, RAN-Fentanyl ✤

fentaNYL transdermal (Rx)

Duragesic

fentaNYL nasal spray (Rx)

Lazanda

fentaNYL SL spray

Subsys

Func. class.: Opioid analgesic
Chem. class.: Synthetic phenylpiperidine

Controlled Substance Schedule II

Do not confuse:
fentaNYL/Sufenta

ACTION: Inhibits ascending pain pathways in CNS, increases pain threshold, alters pain perception by binding to opiate receptors

USES: Controls moderate to severe pain; preoperatively, postoperatively; adjunct to general anesthetic, adjunct to regional anesthesia; **FentaNYL:** anesthesia as premedication, conscious sedation; **Actiq:** breakthrough cancer pain

CONTRAINDICATIONS: Hypersensitivity to opiates, myasthenia gravis

Black Box Warning: Headache, migraine (Actiq, ABSTRAL, Fentora, Lazanda, Onsolis); emergency room use (ABSTRAL, Lazanda); outpatient surgeries (Duragesic TD); opioid-naive patients, respiratory depression

Precautions: Pregnancy (C), breastfeeding, geriatric patients, increased intracranial pressure, seizure disorders, severe respiratory disorders, cardiac dysrhythmias

Black Box Warning: Accidental exposure, ambient temperature increase, fever, skin abrasion (TD patch), substance abuse, surgery, requires an experienced clinician

DOSAGE AND ROUTES

Fentanyl

Anesthetic

• **Adult: IV** 50-100 mcg/kg over 1-2 min

Anesthesia supplement

• **Adult and child >12 yr: IM/IV** 2-20 mcg/kg **IV INF** 0.025-0.25 mcg/kg/min

Induction and maintenance

• **Child 2-12 yr: IV** 2-3 mcg/kg

Preoperatively

• **Adult and child >12 yr: IM/IV** 50-100 mcg q30-60min before surgery

Postoperatively

• **Adult and child >12 yr: IM/IV** 0.05-0.1 mg q1-2hr prn

Moderate/severe pain

• **Adult: IV/IM** 50-100 mcg q1-2hr

Actiq

• **Adult: TRANSMUCOSAL** 200 mcg; redose if needed 15 min after completion of 1st dose; do not give more than 2 doses during titration period, max 4 doses/day

Fentora

• **Adult: BUCCAL** 100 mcg placed above rear molar between upper cheek and gum, a second 100 mcg dose, if needed, may be started 30 min after 1st dose

Onsolis

• **Adult: TRANSMUCOSAL** 200 mcg, titrate, max 1200 mcg/dose or 4 doses/day

ABSTRAL

• **Adult: SL** 100 mcg; another dose may be taken 30 min after 1st, max 2 doses per episode of breakthrough pain; ≥2 hr must elapse before treating again; titrate stepwise over consecutive episodes

FentaNYL transdermal

• **Adult:** 25 mcg/hr; may increase until pain relief occurs; apply patch to flat surface on upper torso and wear for 72 hr; apply new patch on different site for continued relief

FentaNYL nasal spray

• **Adult:** 100 mcg (1 spray in 1 nostril), may retreat after ≥2 hr, titrate upward until adequate analgesia; treat a max of 4 episodes daily

FentaNYL SL spray

• **Adult:** 100 mcg sprayed under tongue, titrate stepwise carefully

Available forms: Inj 0.05 mg/ml; lozenges 100, 200, 300, 400, 600, 800, 1200, 1600 mcg; lozenges on a stick 200, 400, 600, 800, 1200, 1600 mcg; buccal tab 100, 200, 400, 600, 800 mcg; oral dissolving film (Onsolis) 200, 400, 600, 800, 1200 mcg; SL tab (ABSTRAL) 100, 200, 300, 400, 600, 800 mcg; *transdermal:* patch 12, 25, 50, 75, 100 mcg/hr; *SL spray:* 100, 200, 400, 600, 800, 1200, 1600 mcg/spray

Administer:

• By inj (IM, IV); give slowly to prevent rigidity

• Must have emergency equipment available, opioid antagonists, O_2; to be used only by those appropriately trained; IV products to be used in OR, ER, ICU

Transmucosal route

• Remove foil just before administration; instruct patient to place product between cheek and lower gum, moving it back and forth and sucking, not chewing (Actiq); place above rear molar (Fentora); place film on the inside of the cheek (Onsolis); all products not used or only partially used should be flushed down the toilet

Transdermal route

• q72hr for continuous pain relief; dosage adjusted after at least 2 applications; apply to clean, dry skin and press firmly

• Give short-acting analgesics until patch takes effect (8-24 hr); when reducing dosage or switching to alternative IV treatment, withdraw gradually; serum levels drop gradually, give 1/2 the equian-

algesic dose of new analgesic 12-18 hr after removal as ordered

SL spray

• Open blister package with scissors immediately before use; spray contents of unit under tongue; dispose of each used unit after use by placing it into one of the disposable bags provided; seal bag, discard into a trash container out of reach of children

IV route

• IV undiluted by anesthesiologist or diluted with 5 ml or more sterile water or 0.9% NaCl given through Y-tube or 3-way stopcock at 0.1 mg or less/1-2 min. Muscular rigidity may occur with rapid IV administration

Additive compatibilities: Bupivacaine, caffeine citrate, cloNIDine, droperidol, EPINEPHrine, ketamine, lidocaine, ziconotide

Solution compatibilities: D_5W, 0.9% NaCl

Syringe compatibilities: Alprostadil, atracurium, atropine, bupivacaine/ketamine, butorphanol, chlorproMAZINE, cimetidine, cloNIDine/lidocaine, diphenhyDRINATE, diphenhydrAMINE, droperidol, heparin, HYDROmorphone, hydrOXYzine, lidocaine, meperidine, metoclopramide, midazolam, morphine, pentazocine, perphenazine, prochlorperazine, promazine, promethazine, ranitidine, scopolamine

Y-site compatibilities: Abciximab, acyclovir, alfentanil, alprostadil, amikacin, aminocaproic acid, aminophylline, amiodarone, amphotericin B cholesteryl, amphotericin B lipid complex, amphotericin B liposome, anidulafungin, argatroban, ascorbic acid injection, atenolol, atracurium, atropine, azathioprine, aztreonam, benztropine, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, caspofungin, cefamandole, ceFAZolin, cefmetazole, cefonicid, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, cefTAZidime, ceftizoxime, ceftobiprole, cefTRIAXone, cefuroxime, cephalothin, chloramphenicol, chlorproMAZINE, cimetidine, cisatracurium, CISplatin, clindamycin, cloNIDine, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, dexmedetomidine, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, doripenem, doxacurium, doxapram, DOXOrubicin, doxycycline, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, epoetin alfa, eptifibatide, erythromycin, esmolol, etomidate, etoposide, famotidine, fenoldopam, fluconazole, fludarabine, fluorouracil, folic acid, furosemide, ganciclovir, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, heparin, hydrocortisone, HYDROmorphone, hydrOXYzine, IDArubicin, ifosfamide, imipenem-cilastatin, inamrinone, insulin (regular), irinotecan, isoproterenol, ketorolac, labetalol, lansoprazole, levofloxacin, lidocaine, linezolid, LORazepam, LR, magnesium sulfate, mannitol, mechlorethamine, meperidine, metaraminol, methicillin, methotrexate, methotrimeprazine, methoxamine, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, mezlocillin, miconazole, midazolam, milrinone, minocycline, mitoXANtrone, mivacurium, morphine, moxalactam, multiple vitamins injection, mycophenolate, nafcillin, nalbuphine, naloxone, nesiritide, netilmicin, niCARdipine, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxacillin, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pamidronate, pancuronium, papaverine, PEMEtrexed, penicillin G potassium/sodium, pentamidine, pentazocine, PENTobarbital, PHENobarbital, phenylephrine, phytonadione, piperacillin, piperacillin-tazobactam, polymyxin B, potassium chloride, procainamide, prochlorperazine, promethazine, propofol, propranolol, protamine, pyridoxine, quiNIDine, quinupristin-dalfopristin, ranitidine, remifentanil, Ringer's, ritodrine, riTUXimab, rocuronium, sargramostim, scopolamine, sodium acetate/bicarbonate, succinylcholine, SUFentanil,

tacrolimus, teniposide, theophylline, thiamine, thiopental, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, TNA, tobramycin, tolazoline, TPN, trastuzumab, trimetaphan, urokinase, vancomycin, vasopressin, vecuronium, verapamil, vinCRIStine, vinorelbine, vitamin B complex/C, voriconazole, zoledronic acid

SIDE EFFECTS

CNS: Dizziness, delirium, euphoria, sedation
CV: Bradycardia, arrest, hypo/hypertension
EENT: Blurred vision, miosis
GI: Nausea, vomiting, constipation
GU: Urinary retention
INTEG: Rash, diaphoresis
MS: Muscle rigidity
RESP: Respiratory depression, arrest, laryngospasm

PHARMACOKINETICS

Metabolized by liver, excreted by kidneys, crosses placenta, excreted in breast milk, Half-life: IV: 2-4 hr, Transdermal: 13-22 hr, Transmucosal: 7 hr, Buccal: 4-12 hr, 80% bound to plasma proteins
IM: Onset 7-8 min, peak 30 min, duration 1-2 hr
IV: Onset 1 min, peak 3-5 min, duration ½-1 hr

INTERACTIONS

Black Box Warning: Increase: fentaNYL effect, fetal respiratory depression: (cycloSPORINE, ketoconazole, itraconazole, cimetidine, conivaptan, fluconazole, nefazodine, ranolazine, zafirlukast, zileuton

Increase: hypotension—droperidol
Increase: CV depression—diazepam
Increase: fentaNYL effect with other CNS depressants—alcohol, opioids, sedative/hypnotics, antipsychotics, skeletal muscle relaxants, protease inhibitors
Decrease: fentaNYL effect—CYP3A4 inducers (carBAMazepine, phenytoin, PHENobarbital, rifampin)

Drug/Herb
Increase: action of fentaNYL—St. John's wort
Decrease: effect of fentaNYL—echinacea
Drug/Lab Test
Increase: amylase, lipase

NURSING CONSIDERATIONS

Assess:
- VS after parenteral route; note muscle rigidity, drug history, hepatic/renal function tests
- CNS changes: dizziness, drowsiness, hallucinations, euphoria, LOC, pupil reaction
- Allergic reactions: rash, urticaria

Black Box Warning: Respiratory dysfunction: respiratory depression, character, rate, rhythm; notify prescriber if respirations are <10/min

Black Box Warning: Headache/migraine: ABSTRAL, Actiq, Fentora, Lazanda, Onsolis not to be used for this condition; ABSTRAL, Lazanda not to be used in ER; Duragesic TD not to be used for outpatient surgery patients

Black Box Warning: Apnea, respiratory arrest in opioid-naive patients: do not use ABSTRAL, Actiq, Duragesic, Fentora, Lazanda, Onsolis; opioid-tolerant patients are those using ≥60 mg/day oral morphine, ≥30 mg/day oxyCODONE PO, 8 mg/day HYDROmorphone, 25 mcg TD fentaNYL/hr

Evaluate:
- Therapeutic response: induction of anesthesia, relief of breakthrough cancer pain, general pain relief
- Cancer pain, general pain relief

Teach patient/family:
- About CNS changes: physical dependence; not to use with alcohol, other CNS depressants

Black Box Warning: Accidental exposure: Discuss the dangers of children or pets ingesting or coming in contact with product

Transdermal route

Black Box Warning: Ambient temperature: that excessive heat may increase absorption; do not use with heating pads, electric blankets, heat/tanning lamps, saunas, hot tubs, heated waterbeds, when sunbathing

- That excessive perspiration may alter adhesiveness
- To dispose of patch by placing sticky sides together and flushing down toilet
- That patient may need to clip hair before applying to ensure adhesion
- May add first aid tape around the edges if there is a problem with adhesion

ferrous fumarate (Rx)

Ferretts, Ferrimin, Ferro-Sequels, Hemocyte, Palafer ✤, Walgreens Finest Iron

ferrous gluconate (Rx)

Apo-Ferrous Gluconate ✤, Ferate, Walgreens Gold Seal Ferrous Gluconate

ferrous sulfate (Rx)

Apo-Ferrous Sulfate ✤, Equaline Ferrous Sulfate, Leader Ferrous Sulfate, Slow Release Iron, Walgreens Gold Seal Ferrous Sulfate

ferrous sulfate, dried (Rx)

Slow Fe

carbonyl iron (OTC)

(kar'bo-nil)

ICAR Pediatric, Iron Chews

iron polysaccharide (OTC)

iFerex, Niferex, Nu-Iron

Func. class.: Hematinic

Chem. class.: Iron preparation

ACTION: Replaces iron stores needed for red blood cell development as well as energy and O_2 transport and use; fumarate contains 33% elemental iron; gluconate, 12%; sulfate, 20%; iron, 30%; ferrous sulfate exsiccated

USES: Iron deficiency anemia, prophylaxis for iron deficiency in pregnancy, nutritional supplementation

CONTRAINDICATIONS: Sideroblastic anemia, thalassemia, hemosiderosis/hemochromatosis

Precautions: Pregnancy (B) (ferric gluconate complex), (C) (iron dextran, oral products), anemia (long term), ulcerative colitis/regional enteritis, peptic ulcer disease, hemolytic anemia, cirrhosis, sulfite sensitivity

Black Box Warning: Accidental exposure

DOSAGE AND ROUTES

Fumarate

- **Adult: PO** 200-325 mg tid
- **Child: PO** 3 mg/kg/day (elemental iron) tid-qid
- **Infant: PO** 10-25 mg/day (elemental iron) in 3-4 divided doses, max 15 mg/day

Gluconate

- **Adult: PO** 50-100 mg elemental iron tid
- **Child: PO** 3 mg/kg/day in divided doses

Sulfate

- **Adult: PO** 0.75-1.5 g/day in divided doses tid
- **Child 6-12 yr: PO** 3 mg/kg/day in divided doses

Pregnancy

- **Adult: PO** 300-600 mg/day in divided doses

Iron polysaccharide

- **Adult: PO** 100-200 mg tid
- **Child: PO** 4-6 mg/kg/day in 3 divided doses (severe iron deficiency)

Available forms: Fumarate: tabs 63, 195, 200, 324, 325 mg; chewable tabs 100 mg; cont rel tabs 300 mg; oral susp 100 mg/5 ml, 45 mg/0.6 ml; **gluconate:** tabs 300, 320, 325 mg; caps 86, 325,

435 mg; film-coated tabs 300 mg; elix 300 mg/5 ml; **sulfate:** tabs 195, 300, 325 mg; enteric-coated tabs 325 mg; ext rel tabs, time-rel caps, 525 mg; **dried:** tabs 200 mg; ext rel tabs 160 mg; ext rel caps 160 mg; **iron polysaccharide:** tabs 50 mg; caps 150 mg; sol 100 mg/5 ml

Administer:

PO route

- Swallow tabs whole; do not break, crush, or chew unless labeled as chewable
- Between meals for best absorption; may give with juice; do not give with antacids or milk, delay at least 1 hr; if GI symptoms occur, give after meals even if absorption is decreased; eggs, milk products, chocolate, caffeine interfere with absorption
- **Liquid** through plastic straw to avoid discoloration of tooth enamel; dilute thoroughly
- At least 1 hr before bedtime; corrosion may occur in stomach; ferrous gluconate is less irritating of GI tract than ferrous sulfate
- For <6 mo for anemia

SIDE EFFECTS

GI: *Nausea, constipation, epigastric pain, black and red tarry stools,* vomiting, diarrhea

INTEG: Temporarily discolored tooth enamel and eyes

SYST: Hypersensitivity reactions (Feratecit)

PHARMACOKINETICS

PO: Excreted in feces, urine, skin, breast milk; enters bloodstream; bound to transferrin; crosses placenta

INTERACTIONS

Increase: action of iron preparation—ascorbic acid, chloramphenicol

Decrease: absorption of penicillamine, levodopa, methyldopa, fluoroquinolones, l-thyroxine, tetracycline

Decrease: absorption of iron preparations—antacids, H_2-antagonists, proton pump inhibitors, cholestyramine, vit E

Drug/Food

Decrease: absorption—dairy products, caffeine, eggs

Drug/Lab Test

False positive: occult blood

NURSING CONSIDERATIONS

Assess:

- Blood studies: Hct, Hgb, reticulocytes, bilirubin before treatment, at least monthly; iron studies (Iron, TIBC, ferritin)
- ⚠ **Toxicity:** nausea, vomiting, diarrhea (green then tarry stools), hematemesis, pallor, cyanosis, shock, coma
- Elimination; if constipation occurs, increase water, bulk, activity
- **Nutrition:** amount of iron in diet (meat, dark green leafy vegetables, dried beans, dried fruits, eggs)
- Cause of iron loss or anemia, including salicylates, sulfonamides, antimalarials, quiNIDine

Perform/provide:

- Storage in tight, light-resistant container

Evaluate:

- Therapeutic response: improvement in Hct, Hgb, reticulocytes; decreased fatigue, weakness

Teach patient/family:

- That iron will turn stools black or dark green
- **Accidental exposure:** to keep out of reach of children, pets; iron poisoning may occur if increased beyond recommended level
- Not to substitute 1 iron salt for another; that elemental iron content differs (e.g., 300 mg ferrous fumarate contains about 100 mg elemental iron; 300 mg ferrous gluconate contains only about 30 mg elemental iron)
- To avoid reclining position for 15-30 min after taking product to avoid esophageal corrosion
- To follow a diet high in iron; to avoid taking iron, dairy products, calcium

supplements, and vit C together because they compete for absorption

TREATMENT OF OVERDOSE: Induce vomiting; give eggs, milk until lavage can be done

fesoterodine (Rx)

(fess'oh-ter-oh-deen)

Toviaz

Func. class.: Overactive bladder product

Chem. class.: Muscarinic receptor antagonist

ACTION: Relaxes smooth muscles in urinary tract by inhibiting acetylcholine at postganglionic sites

USES: Overactive bladder (urinary frequency, urgency), urinary incontinence

CONTRAINDICATIONS: GI obstruction, ileus, pyloric stenosis, urinary retention, gastric retention, hypersensitivity, closed-angle glaucoma

Precautions: Pregnancy (C), breastfeeding, children, renal/hepatic disease, urinary tract obstruction, ambient temperature increase, autonomic neuropathy, constipation, contact lenses, hazardous activity, GERD, gastroparesis, myasthenia gravis, prostatic hypertrophy, toxic megacolon, ulcerative colitis, possible cross-sensitivity with tolterodine

DOSAGE AND ROUTES

• **Adult and geriatric: PO EXT REL** 4 mg/day, may increase to 8 mg/day based on response, max 4 mg/day in those taking potent CYP3A4 inhibitors

Renal dose

• **Adult: PO EXT REL** CCr <30 ml/min, max 4 mg/day in severe renal impairment

Available forms: EXT REL TABS 4, 8 mg

Administer:

• Do not break, crush, or chew ext rel product

• Give without regard to meals

SIDE EFFECTS

CV: Chest pain, angina, QT prolongation

EENT: Xerophthalmia

GI: *Nausea, vomiting,* abdominal pain, constipation, dry mouth

GU: Dysuria, urinary retention

INTEG: Rash, angioedema

MISC: Peripheral edema, insomnia

MS: Back pain

RESP: Cough

SYST: Infection

PHARMACOKINETICS

Peak 5 hr, rapidly absorbed, protein binding 50%, excreted in urine/feces, half-life 7 hr

INTERACTIONS

Increase: action of fesoterodine—CYP3A4 inhibitors (antiretroviral protease inhibitors, macrolide antiinfectives, azole antifungals)

Increase: anticholinergic effect—antimuscarinics, anticholinergics

Increase: urinary frequency—diuretics

Drug/Herb

Decrease: fesoterodine—caffeine, green tea, guarana

Drug/Food

Increase: fesoterodine level—grapefruit juice

Decrease: fesoterodine level—cola, coffee, tea

NURSING CONSIDERATIONS

Assess:

• **Urinary patterns:** distention, nocturia, frequency, urgency, incontinence

• **Allergic reactions:** rash; if this occurs, product should be discontinued

Perform/provide:

• Storage at room temp; protect from moisture

Evaluate:
• Therapeutic response: absence of urinary frequency, urgency, incontinence
Teach patient/family:
• Not to drink liquids before bedtime
• About the importance of bladder maintenance

fexofenadine (Rx, OTC)

(fex-oh-fi'na-deen)

Allegra, Allegra ODT, GNP Allergy Relief, Premier Value Allergy Relief

Func. class.: Antihistamine—2nd generation

Chem. class.: Piperidine, peripherally selective

Do not confuse:
Allegra/Viagra

ACTION: Acts on blood vessels, GI, respiratory system by competing with histamine for H_1-receptor site; decreases allergic response by blocking pharmacologic effects of histamine, less sedating

USES: Rhinitis, allergy symptoms, chronic idiopathic urticaria

CONTRAINDICATIONS: Breastfeeding, newborn or premature infants, hypersensitivity, severe hepatic disease
Precautions: Pregnancy (C), children, geriatric patients, respiratory disease, closed-angle glaucoma, prostatic hypertrophy, bladder neck obstruction, asthma

DOSAGE AND ROUTES

• **Adult and child >12 yr: PO** Rx only, 60 mg bid or 180 mg/day; PO OTC only, 60 mg bid or 180 mg/day (self-treatment of allergic rhinitis)
• **Child 2-11 yr: PO** 30 mg bid; **ORALLY DISINTEGRATING TAB Child 6-11 yr:** 30 mg bid dissolved on tongue
Renal dose
• **Adult and child ≥12 yr: PO** CCr <80 ml/min, 60 mg/day
• **Child 2-11 yr: PO** CCr <80 ml/min, 30 mg q day
• **Child <2 yr: PO** CCr <80 ml/min, 15 mg q day

Available forms: Tabs 30, 60, 180 mg; oral susp 6 mg/ml, orally disintegrating tab 30 mg
Administer:
• Without regard to meals; caps/tabs should not be given with or right before grapefruit, orange, or apple juice
• **Orally disintegrating tab:** allow to dissolve, swallow; do not remove from blister pack until time of administration
• **Oral susp:** shake well, use calibrated measuring device

SIDE EFFECTS

CNS: Headache, stimulation, drowsiness, sedation, fatigue, confusion, blurred vision, tinnitus, restlessness, tremors, paradoxical excitation in children or geriatric patients
CV: Hypotension, palpitations, bradycardia, tachycardia, dysrhythmias (rare)
GI: Nausea, diarrhea, abdominal pain, vomiting, constipation
GU: Frequency, dysuria, urinary retention, impotence
HEMA: Hemolytic anemia, thrombocytopenia, leukopenia, agranulocytosis, pancytopenia
INTEG: Rash, eczema, photosensitivity, urticaria
RESP: Thickening of bronchial secretions, dry nose, throat

PHARMACOKINETICS

Well absorbed; onset 1 hr; peak 2-3 hr; duration 12-24 hr; 80% excreted in urine; half-life 14.5 hr, increased in renal disease

INTERACTIONS

Decrease: effect—magnesium-aluminum-containing antacids
Drug/Food
Decrease: absorption of product—apple, orange, grapefruit juice

F

Drug/Lab Test
False negative: skin allergy tests

NURSING CONSIDERATIONS

Assess:
- **Allergy:** itchy, runny, watery eyes; congested nose; before and during treatment
- I&O ratio: be alert for urinary retention, frequency, dysuria, especially among geriatric patients; product should be discontinued if these occur; serum creatinine/BUN at baseline and periodically during treatment
- Respiratory status: rate, rhythm, increase in bronchial secretions, wheezing, chest tightness

Perform/provide:
- Storage in tight, light-resistant container

Evaluate:
- Therapeutic response: absence of running or congested nose or rashes

Teach patient/family:
- About all aspects of product use; to notify prescriber if confusion, sedation, hypotension occur
- To avoid driving, other hazardous activity if drowsiness occurs
- To avoid alcohol, other CNS depressants
- Not to exceed recommended dose; that dysrhythmias may occur

TREATMENT OF OVERDOSE:
Lavage, diazepam, vasopressors, IV phenytoin

fidaxomicin
(fye-dax'oh-mye'sin)
Dificid
Func. class.: Antiinfective-macrolide

ACTION: Bactericidal against *Clostridium difficile;* is a fermentation product obtained from *Dactylosporangium aurantiacum;* inhibits RNA synthesis by inhibiting transcription of bacterial RNA polymerases; may act at the early stages of transcription

USES: Pseudomembraneous colitis *Clostridium difficile*-associated diarrhea

CONTRAINDICATIONS: Hypersensitivity
Precautions: Pregnancy (B), breastfeeding, children

DOSAGE AND ROUTES
- **Adult: PO** 200 mg bid × 10 days

Available forms: Tab 200 mg
Administer:
- Without regard to food
- Store at room temperature

SIDE EFFECTS
GI: Nausea, vomiting, abdominal pain, GI bleeding
HEMA: Anemia, neutropenia
META: **Metabolic acidosis,** hyperglycemia

PHARMACOKINETICS
Half-life 12 hr, onset 1 hr, peak 1-5 hr, excreted in feces 92%

INTERACTIONS
Increase: fidaxomicin action—cyclosporine
Drug/Lab Test
Increase: Glucose, LFTs, alk phos
Decrease: sodium bicarbonate

NURSING CONSIDERATIONS

Assess:
- **Pseudomembraneous colitis:** for diarrhea, abdominal pain, fever, fatigue, anorexia, anemia, elevated WBC and low serum albumin; product may be used in place of vancomycin; monitor CBC with differential and stool culture (*Clostridium difficile*), not to be used for systemic infection, obtain C&S before use, monitor glucose (diabetic patients)

Evaluate:
- Positive therapeutic response: resolution of *Clostridium difficile*

Teach patient/family:
- To report GI bleeding, or severe abdominal pain
- To report if pregnancy is planned or suspected or if breastfeeding
- May take without regard to food

filgrastim (Rx)

(fil-grass'stim)

G-CSF, granulocyte colony stimulator, Neupogen

Func. class.: Biologic modifier

Chem. class.: Granulocyte colony-stimulating factor

ACTION: Stimulates proliferation and differentiation of neutrophils

USES: To decrease infection in patients receiving antineoplastics that are myelosuppressive; to increase WBC in patients with product-induced neutropenia; bone marrow transplantation

Unlabeled uses: Neutropenia with HIV infection, aplastic anemia, ganciclovir-induced neutropenia, zidovudine-induced neutropenia

CONTRAINDICATIONS: Hypersensitivity to proteins of *Escherichia coli*

Precautions: Pregnancy (C), breastfeeding, cardiac conditions, children, myeloid malignancies, radiation therapy, sepsis, sickle cell disease, chemotherapy, respiratory disease

DOSAGE AND ROUTES

After myelosuppressive chemotherapy

- **Adult and child: IV/SUBCUT** 5 mcg/kg/day in a single dose × 14 days; may increase by 5 mcg/kg with each cycle

After bone marrow transplantation

- **Adult: IV/SUBCUT** 10 mcg/kg/day as **INF (IV)** over 4 hr or 24 hr, begin 24 hr after chemotherapy and 24 hr after bone marrow transplantation

Peripheral blood progenitor cell collection/therapy

- **Adult:** 10 mcg/kg/day as bolus or **CONT INF** × ≥4 days before leukapheresis, continue to last leukapheresis; may alter dose if WBC >100,000 cells/mm^3

Severe neutropenia (chronic), idiopathic/cyclical

- **Adult: SUBCUT** 5 mcg/kg daily

Available forms: Inj 300 mcg/ml, 480 mcg/1.6 ml, 480 mcg/0.8 ml, 3000 mcg/0.5 ml

Administer:
- Given by subcut inj, short IV inf, or continuous SC or IV inf
- Avoid use within 24 hr before or after chemotherapy
- Do not shake commercial single-dose vials before withdrawing the dose. If the vial is shaken and froth or bubbles form, allow the vial to stand undisturbed for a few minutes until the froth or bubbles dissipate
- Before injection, filgrastim may be allowed to reach room temperature for a maximum of 24 hr. Any vial or syringe exposed to room temperature for more than 24 hr should be discarded
- Visually inspect for particulate matter and discoloration before use

SUBCUT route
- **Subcut inj:** No dilution is necessary; inject by rapid subcut inj, taking care not to inject intradermally
- **Subcut continuous inf:** Infuse subcut at a rate not to exceed 2 ml/hr

IV route
- May be diluted with 5% dextrose. Do not dilute with NS; product can precipitate
- May be diluted to concentrations 5–15 mcg/ml; should be protected from adsorption to plastic by the addition of albumin to a final albumin concentration of 2 mg/ml. Do not dilute filgrastim to a concentration <5 mcg/ml
- **IV inf:** Infuse IV over 15–30 min or as a continuous infusion over 24 hr

Y-site compatibilities: Acyclovir, allopurinol, amikacin, aminophylline, ampicillin, ampicillin/sulbactam, aztreonam, bleomycin, bumetanide, buprenorphine, butorphanol, calcium gluconate, CARBOplatin, carmustine, ceFAZolin, cefoTEtan, cefTAZidime, chlorproMAZINE, cimetidine, CISplatin, cyclophosphamide, cytarabine, dacarbazine, DAUNOrubicin, dexamethasone, diphenhydrAMINE, DOXOrubicin, doxycycline, droperidol, enalaprilat, famotidine, floxuridine, fluconazole, fludarabine, gallium, ganciclovir, granisetron, haloperidol, hydrocortisone, HYDROmorphone, hydrOXYzine, IDArubicin, ifosfamide, leucovorin, LORazepam, mechlorethamine, melphalan, meperidine, mesna, methotrexate, metoclopramide, miconazole, minocycline, mitoXANtrone, morphine, nalbuphine, netilmicin, ondansetron, plicamycin, potassium chloride, promethazine, ranitidine, sodium bicarbonate, streptozocin, ticarcillin, ticarcillin/clavulanate, tobramycin, trimethoprim-sulfamethoxazole, vancomycin, vinBLAStine, vinCRIStine, vinorelbine, zidovudine

SIDE EFFECTS

CNS: Fever, headache
GI: *Nausea,* vomiting, diarrhea, mucositis, anorexia
HEMA: Thrombocytopenia, excessive leukocytosis
INTEG: Alopecia, exacerbation of skin conditions, urticaria, cutaneous vasculitis
MS: Osteoporosis, skeletal pain
OTHER: Chest pain, hypotension
RESP: Acute respiratory distress syndrome, wheezing, alveolar hemorrhage

PHARMACOKINETICS

SUBCUT: Onset 5-60 min, peak 2-8 hr, duration up to 1 wk
IV: Onset 5-60 min, peak 24 hr, duration up to 1 wk

INTERACTIONS

Increase: adverse reactions—do not use this product concomitantly with antineoplastics, lithium
Drug/Lab Test
Increase: uric acid, LDH, alk phos, WBC

NURSING CONSIDERATIONS

Assess:
- Blood studies: CBC, platelet count before treatment and twice weekly; neutrophil counts may be increased for 2 days after therapy
- B/P, respirations, pulse before and during therapy
- Bone pain; give mild analgesics
- CBC with differential, platelets

Perform/provide:
- Storage in refrigerator; do not freeze; may store at room temp up to 24 hr

Evaluate:
- Therapeutic response: absence of infection

Teach patient/family:
- About the technique for self-administration: dose, side effects, disposal of containers and needles; provide instruction sheet

finasteride (Rx)

(fin-ass'te-ride)

Propecia, Proscar

Func. class.: Hormone, androgen inhibitor, hair stimulant

Chem. class.: 5-α-Reductase inhibitor

Do not confuse:
finasteride/furosemide
Proscar/ProSom/PROzac

ACTION: Inhibits 5-α-reductase and reduction in DHT; DHT induces androgenic effects by binding to androgen receptors in the cell nuclei of the prostate gland, liver, skin; prevents development of BHP

USES: Symptomatic benign prostatic hyperplasia (Proscar); male-pattern baldness (Propecia)
Unlabeled uses: Hirsutism, prostate cancer prophylaxis

CONTRAINDICATIONS:

Pregnancy (X), breastfeeding, children, women who are pregnant or who may become pregnant should not handle tabs, hypersensitivity
Precautions: Large residual urinary volume, severely diminished urinary flow, hepatic function abnormalities

DOSAGE AND ROUTES

BPH
• **Adult: PO** 5 mg/day × 6-12 mo (Proscar)
Male-pattern baldness
• **Adult: PO** 1 mg/day for 3 mo or more for results (Propecia)
Hirsutism (unlabeled)
• **Adult (nonpregnant): PO** 5 mg/day alone or in combination with oral contraceptives
Prostate cancer prophylaxis (unlabeled)
• **Adult (male): PO** 5 mg/day
Available forms: Tabs (Propecia) 1 mg, (Proscar) 5 mg
Administer:
• Without regard to meals
• For a minimum of 6 mo; not all patients will respond

SIDE EFFECTS

GU: Impotence, decreased libido, decreased volume of ejaculate, sexual dysfunction
INTEG: Rash
MISC: Breast tenderness, secondary malignancy

PHARMACOKINETICS

Bioavailability 63%; readily absorbed from GI tract; plasma protein binding 90%; metabolized in the liver; excreted in urine (metabolites) 39%, feces (57%); crosses blood-brain barrier; peak 1-2 hr; duration 24 hr

INTERACTIONS

Decrease: finasteride effect—theophylline, adrenergic bronchodilators, anticholinergics
Drug/Lab Test
Decrease: PSA levels

NURSING CONSIDERATIONS

F

Assess:
• **BPH:** urinary patterns, residual urinary volume, severely diminished urinary flow
• PSA levels and digital rectal exam prior to initiating therapy and periodically thereafter
• Hepatic studies before treatment; extensively metabolized in liver
Perform/provide:
• Storage <86° F (30° C); protect from light; keep container tightly closed
Evaluate:
• Therapeutic response: increased urinary flow; decreased postvoiding dribbling, frequency, nocturia or hair growth within 3-6 mo; regression of prostate size
Teach patient/family:
⚠ That pregnant women or women who may become pregnant should not touch crushed tabs or come into contact with the semen of a patient taking this product; that product may adversely affect developing male fetus
• That volume of ejaculate may be decreased during treatment; that impotence and decreased libido may also occur and may continue after discontinuing treatment
• That Propecia results may not occur for 3 mo
• That Proscar results may not occur for 6-12 mo

fingolimod (Rx)

(fin-gol'i-mod)

Gilenya

Func. class.: Biologic response modifier

Chem. class.: Sphingosine 1-phosphate receptor modulator

ACTION: Binds with high affinity to sphingosine 1-phosphate receptors; blocks lymphocyte egress to lymph nodes, thereby reducing the number of peripheral blood lymphocytes; may reduce lymphocyte migration into the CNS

USES: To reduce frequency of exacerbation, to delay physical disability of relapsing forms of MS

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (C), breastfeeding, neonates/infants/children, AIDS, asthma, AV block, bradycardia, cardiac disease, COPD, diabetes mellitus, dysrhythmias, heart failure, hepatic disease, HIV, hypertension, immunosuppression, leukemia, lymphoma, QT prolongation, respiratory insufficiency, sick sinus syndrome, syncope, uveitis

DOSAGE AND ROUTES

- **Adult: PO** 0.5 mg/day

Hepatic dose

- **Adult: PO** Child-Pugh C, total score >10: closely monitor, fingolimod exposure is doubled

Available forms: Caps 0.5 mg

Administer:

PO route

- Watch patient for 6 hr after initial dose or if product not given for >2 wk for development of bradycardia
- Give without regard to food

SIDE EFFECTS

CNS: Asthenia, depression, fatigue, headache, dizziness, encephalopathy, migraine, paresthesias, stroke

CV: AV block, bradycardia, chest pain, hypertension, palpitations

EENT: Blurred vision, vision impairment, ocular pain, macular edema

GI: Abdominal pain, anorexia, diarrhea, jaundice, vomiting, weight loss

HEMA: Leukopenia, lymphopenia, neutropenia

INTEG: Alopecia, pruritus

MS: Back pain

RESP: Dyspnea, cough

SYST: Infection, influenza, secondary malignancy

PHARMACOKINETICS

Protein binding (99.7%), distributed to RBCs (86%), steady state 1-2 months, metabolized by CYP4F2 and CYP2D6 to a lesser extent, terminal half-life 6-9 days, excreted in urine (81% inactive metabolites), peak 12-16 hr

INTERACTIONS

Increase: immunosuppression—antineoplastics, immunosuppressants, immune modulating therapies

Increase: fingolimod effect—ketoconazole

Increase: infection risk—live vaccines

Decrease: effect of—inactive vaccines, toxoids

Increase: risk of torsades de pointes—Class Ia/III antidysrhythmics

NURSING CONSIDERATIONS

Assess:

- **Multiple sclerosis:** improving paresthesia, muscle weakness, clonus, muscle spasms, difficulty with moving, difficulty with coordination of balance, speech, swallowing, vision problems, fatigue; prevention of increasing disability
- **Laboratory monitoring:** obtain before initial dose; CBC, LFTs, serum bilirubin, ophthalmologic exam, antibodies to VZV; if there is no history of chickenpox

or no vaccination, may give VZV vaccination to antibody-negative patient before giving product, postpone for 1 mo after vaccination; obtain ECG for evidence of bradycardia, AV block

Perform/provide:

• Storage at room temp, protect from moisture

Evaluate:

• Therapeutic response: improved symptoms of multiple sclerosis and prevention of increasing disability

Teach patient/family:

• About use of product and expected results; provide med guide to patient
• That continuing follow-up exams and laboratory tests will be required on a regular basis
• To report any side effects of therapy
• To protect product from moisture
• To report chest pain, palpitations, jaundice

flecainide (Rx)

(flek-ay'nide)

Tambocor

Func. class.: Antidysrhythmic (Class IC)

ACTION: Decreases conduction in all parts of the heart, with greatest effect on the His-Purkinje system, which stabilizes cardiac membrane

USES: Life-threatening ventricular dysrhythmias, sustained ventricular tachycardia, supraventricular tachydysrhythmias, paroxysmal atrial fibrillation/flutter associated with disabling symptoms

Unlabeled uses: Atrial fibrillation, single dose

CONTRAINDICATIONS: Hypersensitivity, AV bundle branch block, cardiogenic shock

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, renal/hepatic disease, CHF, respiratory depression, myasthenia gravis, electrolyte abnormalities, atrial fibrillation, sick sinus syndrome, torsades de pointes

Black Box Warning: MI, cardiac arrhythmias, atrial fibrillation

DOSAGE AND ROUTES

PSVT/PAT

• **Adult: PO** 50 mg q12hr; may increase q4days by 50 mg q12hr to desired response, max 300 mg/day

Life-threatening ventricular dysrhythmias

• **Adult: PO** 100 mg q12hr; may increase by 50 mg q12hr q4days, max 400 mg/day

Renal dose

• **Adult: PO** CCr <35 ml/min, 100 mg daily or 50 mg bid initially

Available forms: Tabs 50, 100, 150 mg

Administer:

PO route

• Reduced dosage as soon as dysrhythmia is controlled
• May give with meals for GI upset
• May adjust dose q4days
• Therapeutic trough serum concentrations for adults range from 200 to 1000 ng/ml (average, 500 ng/ml); toxicity is more common with trough serum concentrations >1000 ng/mL; usual therapeutic range in children is 200–500 ng/mL; in some cases, up to 800 ng/mL is required
• Adjust dosage at intervals of ≥4 days (approximate plateau effects) following dosage adjustments; however, longer intervals are needed in patients with renal or hepatic impairment
• Frequent serum drug concentration monitoring is required for patients with severe renal (CrCl <35 ml/min) or hepatic disease and may also be helpful in patients with CHF or in patients with moderate renal disease
• Monitoring of flecainide serum concentrations is strongly recommended in patients receiving amiodarone therapy

SIDE EFFECTS

CNS: *Headache, dizziness,* involuntary movement, confusion, psychosis, rest-

lessness, irritability, paresthesias, ataxia, flushing, somnolence, depression, anxiety, malaise, fatigue, asthenia, tremors
CV: *Hypotension, bradycardia,* angina, PVCs, heart block, cardiovascular collapse, arrest, dysrhythmias, CHF, fatal ventricular tachycardia, palpitations, QT prolongation, torsades de pointes
EENT: Tinnitus, *blurred vision,* hearing loss, corneal deposits, dry eyes
GI: Nausea, vomiting, anorexia, constipation, abdominal pain, flatulence, change in taste, diarrhea
GU: Impotence, decreased libido, polyuria, urinary retention
HEMA: Leukopenia, thrombocytopenia
INTEG: Rash, urticaria, edema, swelling
RESP: Dyspnea, respiratory depression

PHARMACOKINETICS

Peak 3 hr, half-life 12-27 hr, metabolized by liver, excreted unchanged by kidneys (10%), excreted in breast milk

INTERACTIONS

Increase: of both products—propranolol
Increase: CV depressant action—β-blockers, disopyramide, verapamil
Increase: flecainide level—amiodarone, cimetidine, ritonavir
Increase: digoxin level—digoxin
Increase or decrease: effect—urinary, alkalinizing agents, acidifying agents
Drug/Lab Test
Increase: CPK

NURSING CONSIDERATIONS

Black Box Warning: MI, CHF, cardiogenic shock: should not be used in these conditions

Black Box Warning: Atrial fibrillation: avoid use, risk of ventricular dysrhythmias

Black Box Warning: Cardiac dysrhythmias: discontinue in those with prolonged QRS >180 ms or prolonged PR >300 ms

Assess:
• **Electrolyte imbalances:** hypo/hyperkalemia before administration; correct electrolytes before use
• CNS effects: dizziness, confusion, psychosis, paresthesias, seizures; product should be discontinued
• **Flecainide level:** Monitor level in those with CHF or renal failure; peak, trough
Evaluate:
• Therapeutic response: decreased dysrhythmias
Teach patient/family:
• To change position slowly from lying or sitting to standing to minimize orthostatic hypotension
• To take as prescribed; not to skip or double dose
• To avoid hazardous activities that require alertness until response is known
• To carry emergency ID with disorder, medications taken
• To notify all health care providers of treatment
• To report new or worsening cardiac symptoms

TREATMENT OF OVERDOSE:

O_2, artificial ventilation, ECG, DOPamine for circulatory depression, diazepam or thiopental for seizures, treat ventricular dysrhythmias

fluconazole (Rx)

(floo-kon'a-zole)
Diflucan
Func. class.: Antifungal, systemic; azole
Chem class: Triazole

Do not confuse:
Diflucan/Diprivan

ACTION: Inhibits ergosterol biosynthesis, causes direct damage to fungal membrane phospholipids

USES: Oropharyngeal candidiasis, chronic mucocutaneous candidiasis; sys-

emic, vaginal, urinary candidiasis; cryptococcal meningitis; prevention of candidiasis in bone marrow transplant in those who receive chemotherapy and/or radiation therapy; cystitis, fungal prophylaxis, peritonitis, pneumonia, pyelonephritis

Unlabeled uses: Prophylaxis, systemic candidiasis in very-low-birthweight premature infants, blastomycosis, chemotherapy-induced neutropenia, coccidioidomycosis cryptococcosis prophylaxis, endocarditis, endophthalmitis, histoplasmosis infectious arthritis, myocarditis, osteomyelitis, pericarditis

CONTRAINDICATIONS: Hypersensitivity to this product or azoles, pregnancy (D)

Precautions: Breastfeeding, renal/hepatic disease, torsades de pointes

DOSAGE AND ROUTES

Vulvovaginal candidiasis

- **Adult: PO** 150 mg as a single dose

Serious fungal infections

- **Adult: PO/IV** 50-400 mg initially then 200 mg/day for 4 wk
- **Child:** 6-12 mg/kg/day

Oropharyngeal candidiasis

- **Adult: PO/IV** 200 mg initially then 100 mg/day for ≥2 wk
- **Child: PO/IV** 6 mg/kg initially then 3 mg/kg/day for ≥2 wk

Esophageal candidiasis

- **Adult: PO/IV** 200 mg on 1st day, then 100 mg daily × ≥3 wk and for ≥2 wk after resolution of symptoms
- **Child: PO/IV** 6 mg/kg on 1st day, then 3 mg/kg × ≥3 wk and for ≥2 wk after resolution of symptoms

Cryptococcal meningitis

- **Adult: PO/IV** 400 mg on 1st day, then 200 mg daily × 10-12 wk after CSF culture negative
- **Child/infants/neonates ≥14 days: PO/IV** 12 mg/kg on 1st day, then 6-12 mg/kg daily × 10-12 wk after CSF culture negative, max 600 mg/day
- **Neonates 0-14 days: PO/IV** 12 mg/kg on 1st day, then 6-12 mg/kg q72hr × 10-12 wk after CSF culture negative

Prevention of candidiasis in bone marrow transplant

- **Adult: PO/IV** 400 mg/day

Renal disease

- **Adult: PO/IV** CCr ≤50 ml/min, after loading dose, give 50% of usual dose

Available forms: Tabs 50, 100, 150, 200 mg; inj 2 mg/ml; powder for oral susp 50, 200 mg/ml

Administer:

PO route

- Tap bottle to loosen powder, add 24 ml distilled or purified water to bottles with 0.35 or 1.4 g drug, shake well, conc 50 or 200 mg/5 ml, respectively
- Shake oral susp before each use

Intermittent IV INF route

- After diluting according to package directions; run at ≤200 mg/hr; do not use plastic containers in connections; check for bag leaks
- Use inf pump; check for extravasation and necrosis q2hr
- Do not use if cloudy or precipitated
- Do not admix; do not refrigerate

Y-site compatibilities: Acyclovir, aldesleukin, alfentanil, allopurinol, amifostine, amikacin, aminocaproic acid, aminophylline, amiodarone, anidulafungin, ascorbic acid injection, atenolol, atracurium, atropine, azaTHIOprine, aztreonam, benztropine, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium chloride, CARBOplatin, caspofungin, cefamandole, ceFAZolin, cefepime, cefmetazole, cefonicid, cefoperazone, cefoTEtan, cefOXitin, cefpirome, cefTAZidime, ceftizoxime, ceftobiprole, cephalothin, cephapirin, chlorproMAZINE, cimetidine, cisatracurium, CISplatin, codeine, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, diltiazem, dimenhyDRINATE, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, doripenem, doxacurium, DOXOrubicin, DOXOrubi-

cin liposomal, doxycycline, droperidol, drotrecogin alfa, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, epoetin alfa, eptifibatide, ertapenem, erythromycin, esmolol, etoposide, famotidine, fenoldopam, fentaNYL, filgrastim, fludarabine, fluorouracil, folic acid, foscarnet, gallium, ganciclovir, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, heparin, hydrocortisone, HYDROmorphone, IDArubicin, ifosfamide, IV immune globulin, inamrinone, indomethacin, insulin (regular), irinotecan, isoproterenol, ketorolac, labetalol, lansoprazole, leucovorin, levofloxacin, lidocaine, linezolid, LORazepam, LR, magnesium sulfate, mannitol, mechlorethamine, melphalan, meperidine, meropenem, metaraminol, methicillin, methotrexate, methoxamine, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, mezlocillin, miconazole, midazolam, milrinone, minocycline, mitoXANtrone, morphine, moxalactam, multiple vitamins injection, mycophenolate, nafcillin, nalbuphine, naloxone, nesiritide, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxacillin, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pamidronate, pancuronium, papaverine, PEMEtrexed, penicillin G potassium/sodium, pentazocine, PENTobarbital, PHENobarbital, phenylephrine, phenytoin, phytonadione, piperacillin-tazobactam, polymyxin B, potassium chloride, procainamide, prochlorperazine, promethazine, propofol, propranolol, protamine, pyridoxine, quiNIDine, quinupristin-dalfopristin, ranitidine, remifentanil, Ringer's, ritodrine, riTUXimab, rocuronium, sargramostim, sodium acetate/bicarbonate, succinylcholine, SUFentanil, tacrolimus, temocillin, teniposide, theophylline, thiotepa, ticarcillin-clavulanate, tigecycline, tirofiban, TNA, tobramycin, tolazoline, TPN, trastuzumab, trimetaphan, urokinase, vancomycin, vasopressin, vecuronium, verapamil, vinCRIStine, vinorelbine, voriconazole, zidovudine, zoledronic acid

SIDE EFFECTS

CNS: Headache, seizures
CV: QT prolongation, torsades de pointes
GI: Nausea, vomiting, diarrhea, cramping, flatus, increased AST, ALT, hepatotoxicity
HEMA: Agranulocytosis, eosinophilia, leukopenia, neutropenia, thrombocytopenia
INTEG: Stevens-Johnson syndrome, angioedema, anaphylaxis, exfoliative dermatitis, toxic epidermal necrolysis

PHARMACOKINETICS

Peak 2-4 hr, bioavailability (PO) >90%, excreted unchanged in urine 80%, metabolized by CYP3A enzyme system at dose >200 mg/day, elimination half-life 30 hr

INTERACTIONS

Increase: hypoglycemia—oral antidiabetics
Increase: anticoagulation—warfarin
Increase: plasma concentrations—cycloSPORINE, phenytoin, theophylline, rifabutin, tacrolimus, sirolimus
Increase: myopathy, rhabdomyolysis risk—lovastatin, simvastatin
Increase: effect of zidovudine, methadone, SUFentanil, alfentanil, buprenorphine, saquinavir, fentaNYL, ergots
Decrease: effect of oral contraceptives, calcium channel blockers

NURSING CONSIDERATIONS

Assess:

• **Infection:** clearing of CSF and other culture during treatment, obtain C&S baseline and throughout treatment, product may be started as soon as culture is taken

⚠ **Hepatotoxicity:** increasing AST, ALT, periodically alk phos, bilirubin; for renal status: BUN, creatinine

Perform/provide:

• Storage protected from moisture and light; diluted sol stable 24 hr; do not freeze

Evaluate:
- Therapeutic response: decreasing oral candidiasis, fever, malaise, rash; negative C&S for infection organism

Teach patient/family:
- That long-term therapy may be needed to clear infection
- That medication may be taken with food to reduce GI effects
- To notify prescriber of nausea, vomiting, diarrhea, jaundice, anorexia, clay-colored stools, dark urine
- To use alternative method of contraception while taking this product, pregnancy (D)

RARELY USED

fludarabine (Rx)
(floo-dar'a-been)
Fludara, Oforta
Func. class.: Antineoplastic, antimetabolite

USES: Chronic lymphocytic leukemia, non-Hodgkin's lymphoma

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, hypersensitivity

Black Box Warning: Hemolytic anemia, bone marrow suppression, coma, seizures, visual disturbances

DOSAGE AND ROUTES
- **Adult: IV** 25 mg/m² over 30 min × 5 days, may repeat q28days; reconstitute with 2 ml of sterile water for inj; dissolution should occur in <15 sec, adjust dose based on toxicity; **PO** 40 mg/m² × 5 days q28days

fludrocortisone (Rx)
(floo-droe-kor'ti-sone)
Func. class.: Corticosteroid, synthetic
Chem. class.: Mineralocorticoid

ACTION: Promotes increased reabsorption of sodium and loss of potassium, water, hydrogen from distal renal tubules

USES: Adrenal insufficiency, salt-losing adrenogenital syndrome, Addison's disease
Unlabeled uses: Renal tubular acidosis (type IV), idiopathic orthostatic hypotension

CONTRAINDICATIONS: Children <2 yr, hypersensitivity, acute glomerulonephritis, amebiasis, psychoses, Cushing's syndrome, fungal infections
Precautions: Pregnancy (C), breastfeeding, children >2 yr, osteoporosis, CHF, hypertension, diabetes

DOSAGE AND ROUTES
- **Adult: PO** 100-200 mcg/day
- **Child: PO** 50-100 mcg/day

Idiopathic hypotension (unlabeled)
- **Adult: PO** 50-200 mcg/day

Available forms: Tabs 100 mcg (0.1 mg)

SIDE EFFECTS
CNS: *Flushing, sweating,* headache, paralysis, dizziness, seizures
CV: *Hypertension,* circulatory collapse, thrombophlebitis, embolism, tachycardia, CHF, *edema*
ENDO: Weight gain, adrenal suppression, hyperglycemia
META: *Hypokalemia*
MISC: Hypersensitivity, cataracts, GI ulcers, anaphylaxis
MS: Fractures, osteoporosis, weakness

PHARMACOKINETICS

Peak 1.5 hr, half-life 18-36 hr, metabolized by liver, excreted in urine

INTERACTIONS

Increase: B/P—sodium-containing food or medication
Decrease: fludrocortisone action—barbiturates, rifampin, phenytoin
Decrease: potassium levels—thiazides, potassium-wasting products, loop diuretics, amphotericin B, piperacillin, mezlocillin
Drug/Herb
Increase: hypokalemia—aloe, buckthorn, cascara sagrada, Chinese rhubarb, senna
Increase: corticosteroid effect—aloe, licorice, perilla
Drug/Lab Test
Increase: potassium, sodium
Decrease: Hct

NURSING CONSIDERATIONS

Assess:
- Weight daily; notify prescriber of weekly gain >5 lb
- I&O ratio; be alert for decreasing urinary output, increasing edema
- B/P q4hr, pulse; notify prescriber if chest pain occurs
- Potassium depletion: paresthesias, fatigue, nausea, vomiting, depression, polyuria, dysrhythmias, weakness
- Electrolytes: sodium, potassium, chloride, hypokalemia is common

Administer:
- Titrated dose; use lowest effective dose
- With food or milk to decrease GI symptoms

Perform/provide:
- Assistance with ambulation in patient with bone tissue disease to prevent fractures

Evaluate:
- Therapeutic response: correction of adrenal insufficiency

Teach patient/family:
- That emergency ID as steroid user should be carried
- Not to discontinue this medication abruptly
- To notify health care provider of muscle cramps, weight gain, edema, nausea, infection, trauma, stress
- Not to breastfeed while taking this medication
- Avoid exposure to disease, trauma

flumazenil (Rx)

(flu-maz'e-nill)

Anexate ♣, Romazicon

Func. class.: Antidote: benzodiazepine receptor antagonist

Chem. class.: Imidazobenzodiazepine derivative

ACTION: Antagonizes actions of benzodiazepines on CNS, competitively inhibits activity at benzodiazepine recognition site on GABA/benzodiazepine receptor complex

USES: Reversal of sedative effects of benzodiazepines

CONTRAINDICATIONS: Hypersensitivity to this product or benzodiazepines, serious cyclic antidepressant overdose, patients given benzodiazepine for control of life-threatening conditions
Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, status epilepticus, head injury, labor/delivery, renal/hepatic disease, hypoventilation, panic disorder, drug and alcohol dependency, ambulatory patients

Black Box Warning: Benzodiazepine dependence, seizures

DOSAGE AND ROUTES

Reversal of conscious sedation or general anesthesia
- **Adult: IV** 0.2 mg given over 15 sec; wait 45 sec then give 0.2 mg if consciousness does not occur; may be repeated at 60-sec intervals prn (max 3 mg/hr) or 1 mg/5 min

• **Child: IV** 10 mcg (0.01 mg)/kg; cumulative dose of 1 mg or less

Management of suspected benzodiazepine overdose

• **Adult: IV** 0.2 mg given over 30 sec; wait 30 sec then give 0.3 mg over 30 sec if consciousness does not occur; further doses of 0.5 mg can be given over 30 sec at intervals of 1 min up to cumulative dose of 3 mg

• **Child: IV** 10 mcg (0.01 mg/kg), cumulative dose of <1 mg

Available forms: Inj 0.1 mg/ml

Administer:

• Check airway and IV access before administration

• Use large vein

Direct IV route

• Give undiluted or diluted with 0.9% NaCl, D$_5$W, LR; give over 15-30 sec into running IV

• Stable for 24 hr if drawn into a syringe or mixed with other solutions

SIDE EFFECTS

CNS: Dizziness, agitation, emotional lability, confusion, seizures, somnolence, panic attacks

CV: Hypertension, palpitations, cutaneous vasodilation, dysrhythmias, bradycardia, tachycardia, chest pain

EENT: Abnormal vision, blurred vision, tinnitus

GI: Nausea, vomiting, hiccups

SYST: Headache, inj site pain, increased sweating, fatigue, rigors

PHARMACOKINETICS

Terminal half-life 41-79 min, metabolized in liver, onset 1-2 min

INTERACTIONS

• Toxicity: mixed product overdosage

• Antagonize action of benzodiazepines, zaleplon, zolpidem

NURSING CONSIDERATIONS

Assess:

• Cardiac status using continuous monitoring

Black Box Warning: For seizures; protect patient from injury; most likely among those who are withdrawing from benzodiazepines; flumazenil can precipitate benzodiazepine withdrawal and onset of seizures, seizures are increased in head trauma

• GI symptoms: nausea, vomiting; place patient in side-lying position to prevent aspiration

• **Allergic reactions:** flushing, rash, urticaria, pruritus

Black Box Warning: Seizures/benzodiazepine dependence: do not use in those who have used these products for IIP or status epilepticus; use in intensive care setting cautiously, there may be unrecognized benzodiazepine dependence

Evaluate:

• Therapeutic response: decreased sedation, respiratory depression, toxicity

Teach patient/family:

• That amnesia may continue

• Not to engage in hazardous activities for 18-24 hr after discharge

• Not to take any alcohol or nonprescription products for 18-24 hr

flunisolide nasal agent
See Appendix B

fluocinolone ophthalmic
See Appendix B

fluocinolone topical
See Appendix B

fluorometholone ophthalmic
See Appendix B

⚠ HIGH ALERT

fluorouracil (Rx)

(flure-oh-yoor'a-sil)

Adrucil, Carac, Efudex, 5-FU

Func. class.: Antineoplastic, antimetabolite

Chem. class.: Pyrimidine analog

Do not confuse:
fluorouracil/flucytosine

ACTION: Inhibits DNA, RNA synthesis; interferes with cell replication by competitively inhibiting thymidylate production, specific for S phase of cell cycle

USES: **Systemic:** cancer of breast, colon, rectum, stomach, pancreas; **topical:** multiple actinic keratoses, superficial basal cell carcinomas
Unlabeled uses: Anal, biliary tract, cervical, head and neck, hepatocellular, ovarian cancer

CONTRAINDICATIONS: Pregnancy (X), breastfeeding, hypersensitivity, poor nutritional status, serious infections

Black Box Warning: Bone marrow suppression

Precautions: Children, renal/hepatic disease, angina

Black Box Warning: GI bleeding

DOSAGE AND ROUTES

Doses vary widely, based on actual body weight unless obese, then based on lean body weight

Advanced colorectal cancer

• **Adult: IV bolus** 300-500 mg/m²/day × 4-5 days q28days or 600-1500 mg/m² weekly or every other wk; continuous IV infusion: 300-1000 mg/m²/day × 4-5 days q4wk or 300 mg/m²/day indefinitely, high dose 3000-3400 mg/m² over 24-72 hr

Breast cancer

• **Adult: IV bolus** 400-600 mg/m² on days 1 and 8 of every cycle with cyclophosphamide and methotrexate or 600 mg/m² day 1 with cyclophosphamide and methotrexate q21-28days

Pancreatic cancer

• **Adult: IV bolus** 600 mg/m² on days 1, 8, 29, 36 with DOXOrubicin and mitoMYcin q8wk

Actinic/solar keratoses

• **Adult: TOP** 1% cream/sol 1-2×/day or 2-5% sol for hands

Superficial basal cell carcinoma

• **Adult: TOP** 5% sol or cream 2×/day × 3-12 wk

Available forms: Inj 50 mg/ml; cream 0.5%, 1%, 5%; sol 1%, 2%, 5%

Administer:

• Antiemetic 30-60 min before product to prevent vomiting, for several days thereafter

Topical route

• The 1% strength is used on face; higher strengths are used on other parts of the body

• Wear gloves when applying; may use with a loose dressing; use plastic or wooden applicator

IV route

• Prepared in biologic cabinet using gloves, gown, mask; use cytotoxic handling procedures

• Undiluted; may inject through Y-tube or 3-way stopcock; give over 1-3 min; may be diluted in NS, D_5W; given as a continuous infusion in plastic containers, do not refrigerate/freeze, protect from light, discard unused portion

Y-site compatibilities: Acyclovir, alatrofloxacin, alfentanil, allopurinol, amifostine, amikacin, amphotericin B lipid complex, amphotericin B liposome, ampicillin, ampicillin-sulbactam, anidulafungin, argatroban, atenolol, atracurium, azithromycin, aztreonam, bivalirudin, bleomycin, bumetanide, butorphanol, calcium gluconate, CARBOplatin, ceFAZolin, cefepime, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, cefTAZi-

dine, ceftizoxime, cefTRIAXone, cefuroxime, cimetidine, cisatracurium, CISplatin, clindamycin, codeine, cyclophosphamide, cycloSPORINE, DAPTOmycin, dexamethasone, digoxin, DOCEtaxel, DOPamine, doripenem, DOXOrubicin liposomal, enalaprilat, ePHEDrine, ertapenem, erythromycin, esmolol, etoposide phosphate, famotidine, fenoldopam, fentaNYL, fluconazole, fludarabine, foscarnet, fosphenytoin, furosemide, ganciclovir, gatifloxacin, gemcitabine, gentamicin, granisetron, heparin, hydrocortisone, HYDROmorphone, ifosfamide, imipenem-cilastatin, inamrinone, isoproterenol, ketorolac, labetalol, leucovorin, levorphanol, lidocaine, linezolid, magnesium sulfate, mannitol, melphalan, meperidine, meropenem, mesna, methohexital, methotrexate, methylPREDNISolone, metoprolol, metroNIDAZOLE, milrinone, mitoMYcin, mitoXANtrone, morphine sulfate, nalbuphine, naloxone, nesiritide, nitroglycerin, nitroprusside, octreotide, ofloxacin, PACLitaxel, palonosetron, pamidronate, pancuronium, pantoprazole, PEMEtrexed, PENTobarbital, PHENobarbital, phenylephrine, piperacillin, piperacillin-tazobactam, potassium chloride/phosphates, procainamide, propofol, propranolol, ranitidine, remifentanil, riTUXimab, sargramostim, sodium acetate/bicarbonate/phosphates, succinylcholine, SUFentanil, sulfamethoxazole-trimethoprim, teniposide, theophylline, thiopental, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, tobramycin, trastuzumab, vasopressin, vecuronium, vinBLAStine, vinCRIStine, vitamin B complex/C, voriconazole, zidovudine, zoledronic acid

SIDE EFFECTS

Systemic use

CNS: Lethargy, malaise, weakness, acute cerebellar dysfunction
CV: Myocardial ischemia, angina
EENT: Light intolerance, lacrimation
GI: *Anorexia, stomatitis,* diarrhea, nausea, vomiting, hemorrhage, enteritis, glossitis
HEMA: Thrombocytopenia, leukopenia, myelosuppression, anemia, agranulocytosis
INTEG: *Rash,* fever, photosensitivity, anaphylaxis

PHARMACOKINETICS

Half-life 20 hr terminal; metabolized in liver; excreted in urine; crosses blood-brain barrier

F

INTERACTIONS

Increase: bleeding—anticoagulants, NSAIDs, platelet inhibitors, thrombolytics
Increase: toxicity—metroNIDAZOLE
Increase: toxicity, bone marrow depression—radiation or other antineoplastics, leucovorin
Decrease: antibody response—live virus vaccines
Decrease: effect of phenytoin
Drug/Lab Test
Increase: AST, ALT, LDH, serum bilirubin, Hct, Hgb, WBC, platelets, 5-HIAA
Decrease: albumin

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Bone marrow suppression: CBC, differential, platelet count daily (IV); withhold product if WBC is $<3500/mm^3$ or platelet count is $<100,000/mm^3$; notify prescriber of results; product should be discontinued; nadir of leukopenia within 2 wk, recovery 1 mo, if pretreatment of WBC $<2,000/mm^3$ or platelets $<100,000/mm^3$, delay until recovery of counts above this level

- Renal studies: BUN, serum uric acid, urine CCr, electrolytes before, during therapy
- Hepatic studies before, during therapy: bilirubin, alk phos, AST, ALT, LDH before, during therapy
- **Bleeding:** hematuria, guaiac, bruising, petechiae, mucosa or orifices q8hr

- Inflammation of mucosa, breaks in skin; buccal cavity q8hr for dryness, sores or ulceration, white patches, oral pain, bleeding, dysphagia
- GI symptoms: frequency of stools, cramping, intractable vomiting, stomatitis
- **Infection:** those with current infections should be treated before receiving 5-FU, the dose reduced or discontinued if infection occurs

Evaluate:
- Therapeutic response: decreased tumor size, spread of malignancy

Teach patient/family:
- To avoid crowds, persons with known infection
- To avoid foods with citric acid, hot or rough texture if stomatitis is present; to drink adequate fluids
- To report stomatitis: any bleeding, white spots, ulcerations in mouth; that patient should examine mouth daily, report symptoms; viscous lidocaine may be used; rinsing of mouth tid-qid with water, club soda; brushing of teeth bid-tid with soft brush or cotton-tipped applicator for stomatitis; use unwaxed dental floss, give ice chips for mucositis
- To report signs of **infection:** fever, sore throat, flulike symptoms
- To report signs of **anemia:** fatigue, headache, faintness, shortness of breath, irritability
- To report **bleeding:** to avoid razors, commercial mouthwash, IM inj if counts are low
- Not to use aspirin products or NSAIDs
- To use contraception during therapy (men and women), pregnancy (X); to avoid breastfeeding (topical use)
- Not to receive vaccinations during therapy
- To use sunscreen or stay out of the sun to prevent photosensitivity
- About hair loss; to explore use of wigs or other products until hair regrowth occurs
- To apply topically only to affected areas, being careful around mouth, nose, eyes

FLUoxetine (Rx)

(floo-ox'eh-teen)

PROzac, PROzac Weekly, Sarafem

Func. class.: Antidepressant, SSRI (selective serotonin reuptake inhibitor)

Do not confuse:
PROzac/Proscar/ProSom/PriLOSEC
Sarafem/Serophene

ACTION: Inhibits CNS neuron uptake of serotonin but not of norepinephrine

USES: Major depressive disorder, obsessive-compulsive disorder (OCD), bulimia nervosa; *Sarafem:* premenstrual dysphoric disorder (PMDD), panic disorder

Unlabeled uses: Alcoholism, anorexia nervosa, borderline personality disorder, obesity, posttraumatic stress disorder, autism, fibromyalgia, orthostatic hypotension, premature ejaculation

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (C), breastfeeding, geriatric patients, diabetes mellitus, narrow-angle glaucoma, cardiac malformations in infants (exposed to FLUoxetine in utero)

Black Box Warning: Children, suicidal ideation

DOSAGE AND ROUTES

Depression/obsessive-compulsive disorder
- **Adult: PO** 20 mg/day in AM; after 4 wk, if no clinical improvement is noted, dose may be increased to 20 mg bid in AM, PM, max 80 mg/day; **PO** 90 mg/wk
- **Geriatric: PO** 5-10 mg/day, increase as needed
- **Child 8-18 yr: PO** 10-20 mg/day, max 20 mg/day

Premenstrual dysphoric disorder (Sarafem)
• **Adult: PO** 20 mg/day, may be taken daily 14 days before menses
Alcoholism (unlabeled)
• **Adult: PO** 20-80 mg/day
Anorexia nervosa (unlabeled)
• **Adult: PO** 10 mg q day, max 60 mg/day
Borderline personality disorder/fibromyalgia/autism/orthostatic hypotension/premature ejaculation/hot flashes (unlabeled)
• **Adult: PO** 20 mg/day, max 80 mg/day
Obesity (unlabeled)
• **Adult: PO** 60 mg/day after titration
Posttraumatic stress disorder (unlabeled)
• **Adult: PO** 10-80 mg/day
Available forms: Caps 10, 20, 40 mg; tabs 10, 20 mg; oral sol 20 mg/5 ml; del rel caps (PROzac Weekly) 90 mg; tab 10, 15, 20 mg (Sarafem)
Administer:
• Without regard to meals
• Crushed if patient is unable to swallow medication whole (tab only)
• Gum, hard candy, frequent sips of water for dry mouth
• **PROzac Weekly** on the same day each week, swallow whole; do not crush, cut, chew
• **Oral sol:** use oral syringe or calibrated measuring device

SIDE EFFECTS

CNS: *Headache, nervousness, insomnia, drowsiness, anxiety, tremor, dizziness, fatigue, sedation, poor concentration, abnormal dreams, agitation,* seizures, apathy, euphoria, hallucinations, delusions, psychosis, suicidal ideation, neuroleptic malignant syndrome–like reactions, serotonin syndrome
CV: *Hot flashes, palpitations,* angina pectoris, hypertension, tachycardia, 1st-degree AV block, bradycardia, MI, thrombophlebitis
EENT: Visual changes, ear/eye pain, photophobia, tinnitus
GI: *Nausea, diarrhea, dry mouth, anorexia, dyspepsia, constipation, cramps, vomiting, taste changes, flatulence, decreased appetite*
GU: *Dysmenorrhea, decreased libido, urinary frequency, UTI,* amenorrhea, cystitis, impotence, urine retention
HEMA: Hemorrhage
INTEG: *Sweating, rash, pruritus,* acne, alopecia, urticaria, angioedema, exfoliative dermatitis, Stevens-Johnson syndrome, toxic epidermal necrolysis
META: Hyponatremia
MS: *Pain,* arthritis, twitching
RESP: *Infection, pharyngitis, nasal congestion, sinus headache, sinusitis, cough, dyspnea, bronchitis,* asthma, hyperventilation, pneumonia
SYST: *Asthenia, viral infection, fever, allergy, chills*

PHARMACOKINETICS

PO: Peak 6-8 hr, metabolized in liver, excreted in urine, terminal half-life 2-3 days, norfluoxetine active metabolite half-life 4-16 days, steady state 28-35 days, protein binding 94%

INTERACTIONS

Increase: serotonin syndrome—SSRIs, SNRIs, serotonin-receptor agonists, selegiline, busPIRone, tryptophan, phenothiazines, haloperidol, loxapine, thiothixene, tricyclics; do not use concurrently
Increase: bleeding risk—platelet inhibitors, thrombolytics, NSAIDs, salicylates, anticoagulants
⚠ Do not use MAOIs with or 14 days prior to FLUoxetine
Increase: levels or toxicity of carBAMazepine, lithium, digoxin, warfarin, phenytoin, diazepam, vinBLAStine, donepezil, antidiabetics, dorifenacin, paricalcitrol, budesonide, bosentan, thioridazine
Increase: CNS depression—alcohol, antidepressants, opioids, sedatives
Decrease: FLUoxetine effect—cyproheptadine

Drug/Herb

⚠ Do not use together; increased risk of serotonin syndrome: St. John's wort, SAM-e

Increase: CNS effect—hops, kava, lavender, valerian

Drug/Lab Test

Increase: serum bilirubin, blood glucose, alk phos, BUN, CK

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Mental status: mood, sensorium, affect, suicidal tendencies (child/young adult), increase in psychiatric symptoms, depression, panic; monitor for seizures, seizure potential increased, sarafem is not approved for children

• **Bulimia nervosa:** appetite, weight daily, increase nutritious foods in diet, watch for bingeing and vomiting

⚠ **Allergic reactions/serious skin reactions:** angioedema, exfoliative dermatitis, Stevens-Johnson syndrome, toxic epidermal necrolysis, itching, rash, urticaria; product should be discontinued, may need to give antihistamine

• B/P (lying/standing), pulse q4hr; if systolic B/P drops 20 mm Hg, hold product, notify prescriber; ECG for flattening of T wave, bundle branch, AV block, dysrhythmias in cardiac patients

• Blood studies: CBC, leukocytes, differential, cardiac enzymes if patient is receiving long-term therapy; check platelets; bleeding can occur, thyroid function, growth rate, weight

• Hepatic studies: AST, ALT, bilirubin, creatinine, weight weekly; appetite may decrease with product

• Alcohol consumption; if alcohol is consumed, hold dose until AM

Perform/provide:

• Storage at room temp; do not freeze

• Safety measures, primarily for geriatric patients

Evaluate:

• Therapeutic response: decreased depression, symptoms of OCD

Teach patient/family:

• That therapeutic effect may take 1–4 wk

• To use caution when driving, performing other activities requiring alertness because of drowsiness, dizziness, blurred vision

• To avoid alcohol, other CNS depressants

• To notify prescriber if pregnant, planning to become pregnant, or breastfeeding

• To change positions slowly because orthostatic hypotension may occur

• To avoid all OTC products unless approved by prescriber

Black Box Warning: That suicidal thoughts/behaviors may occur in young adults, children

fluPHENAZine decanoate (Rx)

(floo-fen'a-zeen)

Modecate ✱

fluPHENAZine hydrochloride (Rx)

Func. class.: Antipsychotic

Chem. class.: Phenothiazine, piperazine

Do not confuse:

Prolixin/Proloid

ACTION: Depresses cerebral cortex, hypothalamus, limbic system, which control activity and aggression; blocks neurotransmission produced by DOPamine at synapse; exhibits strong α-adrenergic and anticholinergic blocking action; mechanism for antipsychotic effects is unclear

USES: Psychotic disorders, schizophrenia

CONTRAINDICATIONS: Hypersensitivity, circulatory collapse, hepatic damage, cerebral arteriosclerosis, coronary disease, severe hypo/hypertension,

blood dyscrasias, coma, brain damage, closed-angle glaucoma, bone marrow depression, alcohol and barbiturate withdrawal

Precautions: Pregnancy (C), breast-feeding, children <12 yr, geriatric patients, seizure disorders, hypertension, cardiac/hepatic disease

Black Box Warning: Increased mortality in elderly patients with dementia-related psychosis

DOSAGE AND ROUTES

Decanoate

- **Adult and child >16 yr: IM/SUBCUT** 12.5-25 mg q1-3wk, may increase slowly
- **Child 12-16 yr: IM/SUBCUT** 6.25-18.75 mg, then repeat q1-3wk, then increase slowly; max 25 mg
- **Child 5-12 yr: IM/SUBCUT** 3.125-12.5 mg, then repeat q1-3wk, increase slowly

HCl

- **Adult: PO** 2.5-10 mg in divided doses q6-8hr, max 40 mg/day; **IM** initially 1.25 mg then 2.5-10 mg in divided doses q6-8hr
- **Child: PO** 0.25-3.5 mg/day in divided doses q4-6hr, max 10 mg/day

Available forms: *Decanoate:* inj 25 mg/ml; *HCl:* tabs 1, 2.5, 5, 10 mg; inj 2.5 mg/ml; elixir 2.5 mg/5 ml; oral solution 5 mg/ml

Administer:

PO route

- Give with food, milk, or a full glass of water to minimize gastric irritation
- **Oral concentrate:** Give using a calibrated measuring device. Dilute just before use with 120–240 ml of water, saline, milk, 7-Up, carbonated orange beverage, or apricot, orange, pineapple, prune, tomato, or V-8 juice. Do not mix with beverages containing caffeine (coffee, cola), tannics (tea), or pectinates (apple juice) or with other liquid medications. Avoid spilling the solution on the skin and clothing
- **Oral elixir:** Give using a calibrated measuring device. Avoid spilling the solution on the skin and clothing

Injectable routes

- Visually inspect for particulate matter and discoloration before use, slight yellow to amber color does not alter potency, markedly discolored solutions should be discarded

IM route (fluPHENAZine HCl only)

- No dilution necessary; if irritation occurs, subsequent IM doses may be diluted with NS for injection or 2% procaine
- Inject slowly and deeply into the upper outer quadrant of the gluteal muscle using a dry syringe and needle, aspirate before injection
- Keep patient in a recumbent position for at least 30 min following injection to minimize hypotensive effects
- Rotate the site of injection to avoid irritation or sterile abscess formation with repeat use

IM depot injection (fluPHENAZine decanoate or fluPHENAZine enanthate)

- FluPHENAZine decanoate or enanthate injections are administered IM or subcut, do not give IV
- FluPHENAZine depot injections must be drawn up using a dry syringe and needle of at least 21-G, do not dilute
- Inject slowly and deeply into the upper outer quadrant of the gluteal muscle, aspirate before injection
- Keep patient in a recumbent position for at least 30 min following the initial injection to minimize hypotensive effects. Once patient is dose-stabilized on depot formulation, this precaution may be modified. Rotate the site of injection to avoid irritation or sterile abscess formation with repeat administration

Subcut injection route (fluPHENAZine decanoate or fluPHENAZine enanthate)

- FluPHENAZine decanoate or enanthate injections are administered via IM or SC injection only, do not administer IV
- FluPHENAZine depot injection solutions must be drawn up using a dry syringe and a needle of at least 21-G, do not dilute
- Inject subcut, taking care not to inject intradermally

• Keep patient in a recumbent position for at least 30 min following the initial injection to minimize hypotensive effects. Once patient is dose-stabilized on depot formulation, this precaution may be modified for ambulatory patients; rotate the injection sites

SIDE EFFECTS

CNS: *EPS: pseudoparkinsonism, akathisia, dystonia, tardive dyskinesia, drowsiness, headache,* seizures, neuroleptic malignant syndrome

CV: *Orthostatic hypotension,* hypertension, cardiac arrest, ECG changes, tachycardia

EENT: Blurred vision, glaucoma, dry eyes

GI: *Dry mouth, nausea, vomiting, anorexia, constipation,* diarrhea, jaundice, weight gain, paralytic ileus, hepatitis, cholecystic jaundice

GU: Urinary retention, urinary frequency, enuresis, impotence, amenorrhea, gynecomastia

HEMA: Anemia, leukopenia, leukocytosis, agranulocytosis, aplastic anemia, thrombocytopenia

INTEG: *Rash,* photosensitivity, dermatitis

RESP: Laryngospasm, dyspnea, respiratory depression

PHARMACOKINETICS

Metabolized by liver, excreted in urine (metabolites), crosses placenta, enters breast milk, protein binding >90%, not dialyzable

PO/IM (HCl): Onset 1 hr, peak 2-4 hr, duration 6-8 hr, half-life 3.5-4 days

IM/SUBCUT (decanoate): Onset 1-3 days; peak 1-2 days, duration over 4 wk, single-dose half-life 6.8-9.6 days, multiple dose 14.3 days

INTERACTIONS

Increase: serotonin syndrome, neuroleptic malignant syndrome—SSRIs, SNRIs, serotonin-receptor agonists

Increase: QT prolongation, torsades de pointes (at higher doses)—amiodarone, arsenic trioxide, astemizole, dasatinib, disopyramide, dofetilide, droperidol, erythromycin, flecainide, gatifloxacin, ibutilide, levomethadyl, ondansetron, paliperidone, palonosetron, some antidepressants, vorinostat, ziprasidone, haloperidol

Increase: sedation—other CNS depressants, alcohol, barbiturate anesthetics, haloperidol, metyrosine, risperiDONE

Increase: toxicity—EPINEPHrine

Increase: anticholinergic effects—anticholinergics

Decrease: effects of levodopa, lithium

Decrease: fluPHENAZine effects—smoking, barbiturates

Drug/Lab Test

Increase: LFTs, cardiac enzymes, cholesterol, blood glucose, prolactin, bilirubin, cholinesterase

Decrease: hormones (blood and urine)

False positive: pregnancy tests, PKU urinary steroids, 17-OHCS

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Increased mortality in elderly patients with dementia-related psychosis

• **Serotonin syndrome, neuroleptic malignant syndrome:** severe EPS, increased CPK, altered mental state, sinus tachycardia, change in B/P, sweating, often occurs in young men, heat stress, physical exhaustion, dehydration, organic brain disease

⚠ **QT prolongation, torsades de pointes:** ECG for changes

• Bilirubin, CBC, LFTs monthly

• Urinalysis recommended before and during prolonged therapy

• Affect, orientation, LOC, reflexes, gait, coordination, sleep pattern disturbances

• B/P standing and lying; pulse and respirations q4hr during initial treatment; establish baseline before starting treatment; report drops of 30 mm Hg

• Dizziness, faintness, palpitations, tachycardia on rising

• **EPS** including akathisia (inability to sit still, no pattern to movements), tardive dyskinesia (bizarre movements of jaw,

mouth, tongue, extremities), pseudoparkinsonism (rigidity, tremors, pill rolling, shuffling gait)
• Constipation, urinary retention daily; if these occur, increase bulk, water in diet
Perform/provide:
• Supervised ambulation until stabilized on medication; do not involve patient in strenuous exercise; fainting possible; patient should not stand still for long periods
Evaluate:
• Therapeutic response: decrease in emotional excitement, hallucinations, delusions, paranoia, reorganization of patterns of thought, speech
Teach patient/family:
• That orthostatic hypotension occurs often; to rise from sitting or lying position gradually; to avoid hazardous activities until stabilized on medication
• To avoid hot tubs, hot showers, tub baths because hypotension may occur; that in hot weather, heat stroke may occur; to take extra precautions to stay cool
⚠ To avoid abrupt withdrawal of this product or EPS may result; that product should be withdrawn slowly
• To avoid OTC preparations (cough, hay fever, cold) unless approved by prescriber; that serious product interactions may occur; to avoid use with alcohol, CNS depressants; that increased drowsiness may occur
• To use a sunscreen to prevent burns
• About the importance of compliance with product regimen
• About EPS and the need for meticulous oral hygiene because oral candidiasis may occur
• To report sore throat, malaise, fever, bleeding, mouth sores; if these occur, CBC should be drawn, product discontinued
• That urine may turn pink to reddish brown

TREATMENT OF OVERDOSE: Lavage; if orally ingested, provide an airway; *do not induce vomiting*

flurandrenolide topical
See Appendix B

flurbiprofen ophthalmic
See Appendix B

flutamide (Rx)
(floo'ta-mide)
Euflex ✤
Func. class.: Antineoplastic, hormone
Chem. class.: Antiandrogen

F

ACTION: Interferes with androgen uptake in the nucleus or androgen activity in target tissues; arrests tumor growth in androgen-sensitive tissue (i.e., prostate gland)

USES: Metastatic prostatic carcinoma, stage D_2 in combination with LHRH agonistic analogs (leuprolide), B_2-C in combination with goserelin and radiation

CONTRAINDICATIONS: Pregnancy (D), hypersensitivity

Black Box Warning: Severe hepatic disease

Precautions: G6PD deficiency, hemoglobinopathy, lactase deficiency, polycystic ovary syndrome, tobacco smoking

DOSAGE AND ROUTES

• **Adult: PO** 250 mg q8hr for a daily dosage of 750 mg
Available forms: Caps 125, 250 ✤ mg
Administer:
• Do not break, crush, chew caps
• Give without regard to food with a full glass of water
• Use cytotoxic handling procedures

SIDE EFFECTS

CNS: *Hot flashes,* drowsiness, confusion, depression, anxiety, paresthesia

GI: *Diarrhea, nausea, vomiting,* increased levels in hepatic studies, hepatitis, anorexia, hepatotoxicity, abdominal pain, cholestasis, **hepatic necrosis/failure**
GU: *Decreased libido, impotence, gynecomastia*
HEMA: Hemolytic anemia, leukopenia, thrombocytopenia
INTEG: Irritation at site, rash, photosensitivity
MISC: Edema, neuromuscular and pulmonary symptoms, hypertension, secondary malignancy

PHARMACOKINETICS

Rapidly and completely absorbed; excreted in urine and feces as metabolites; half-life 6 hr, geriatric half-life 8 hr; 94% protein binding, peak 2 hr

INTERACTIONS

Increase: PT—warfarin
Decrease: flutamide action—LHRH analog (leuprolide)
Drug/Lab Test
Increase: LFTs, BUN, creatinine
Decrease: WBC, platelets

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Severe hepatic disease: AST, ALT, alk phos, which may be elevated; if LFTs elevated, product may need to be discontinued; monitor CBC, bilirubin, creatinine

- CNS symptoms, including drowsiness, confusion, depression, anxiety

Evaluate:

- Therapeutic response: decrease in prostatic tumor size, decrease in spread of cancer

Teach patient/family:

- To report side effects: decreased libido, impotence, breast enlargement, hot flashes, diarrhea

Black Box Warning: Hepatotoxicity: to report nausea, vomiting, yellow eyes or skin, dark urine, clay-colored stools; hepatotoxicity may be the cause

- Notify of yellow, green urine discoloration
- Avoid sun exposure, tanning beds
- To use contraception during treatment; pregnancy category (D)

fluticasone (Rx)

(floo-tic'a-sone)
Flonase, Flovent HFA, Flovent Diskus, Veramyst (nasal spray)
Func. class: Corticosteroids, inhalation; antiasthmatic

ACTION: Decreases inflammation by inhibiting mast cells, macrophages, and leukotrienes; antiinflammatory and vasoconstrictor properties

USES: Prevention of chronic asthma during maintenance treatment in those requiring oral corticosteroids; nasal symptoms of seasonal/perennial, allergic/nonallergic rhinitis
Unlabeled uses: COPD

CONTRAINDICATIONS: Hypersensitivity to this product or milk protein, primary treatment in status asthmaticus
Precautions: Pregnancy (C), breastfeeding, active infections, glaucoma, diabetes, immunocompromised patients

DOSAGE AND ROUTES

Prevention of chronic asthma during maintenance treatment in those requiring oral corticosteroids

Flovent HFA

- **Adult and child ≥12 yr: INH** 88-660 mcg bid (in those previously taking bronchodilators alone); **INH** 88-220 mcg bid, max 440 mcg bid (in those previously taking inhaled corticosteroids); **INH** 440 mcg bid, max 880 mcg

bid (in those previously taking oral corticosteroids)
• **Child 4-11 yr: INH** 88 mcg bid

Flovent Diskus

• **Adult and child ≥12 yr: INH** 100 mcg bid, max 500 mcg (in those previously taking bronchodilators alone); **INH** 100-250 mcg bid, max 500 mcg bid (in those previously taking inhaled corticosteroids); **INH** 500-1000 mcg bid, max 1000 mcg bid (in those previously taking oral corticosteroids)
• **Child 4-11 yr: INH** Initially 50 mcg bid, max 100 mcg bid (in those previously taking bronchodilators alone or inhaled corticosteroids)

Nasal symptoms of seasonal, perennial allergic, nonallergic rhinitis

Flonase

• **Adult:** nasal 2 sprays initially, in each nostril daily or 1 spray bid, when controlled, lower to 1 spray in each nostril daily
• **Adolescent/child >4 yr:** nasal 1 spray in each nostril daily, may increase to 2 sprays in each nostril daily, when controlled lower to 1 spray in each nostril daily

Veramyst

• **Adult/child ≥12 yr:** nasal 2 sprays in each nostril daily
• **Child 2-11 yr:** nasal 1 spray in each nostril daily

Available forms: Oral inhalation aerosol 44, 110, 220 mcg; oral inhalation powder 50, 100, 250 mcg; nasal spray (Veramyst) 27.5 mcg/actuation, (Flonase) 50 mcg/actuation

Administer:

• Give at 1-min intervals; if a bronchodilator aerosol spray is used, use bronchodilator first, wait 5-15 min, then use fluticasone
• Decrease dose to lowest effective dose after desired effect; decrease dose at 2-4 wk intervals

Inhalation route (aerosol)

• Shake well, prime before 1st use, release 4 sprays into air away from face, prime using 1 spray if not used for ≥7 days; when the counter reads 000, discard; clean inhaler daily in warm water, dry; do not share inhaler with others
• In general, child <4 yr requires a face mask with spacer/VHC device for delivery; allow 3-5 INH per actuation; do not use spacer with Flovent Diskus

Inhalation route: Powder for oral inhalation (Flovent Diskus)

• Before initial use, remove the diskus foil pouch and throw away the foil pouch; the diskus will be in the closed position. Fill in the "Pouch opened" and "Use by" dates in the blank lines on the label; the "Use by" date for Flovent Diskus 50 mcg is 6 wk from the date the pouch is opened; the "Use by" date for Diskus 100 mcg and 250 mcg is 2 months from the date the pouch is opened
• Open the diskus by holding in one hand and using the thumb of the other to push the thumb grip away as far as it will go until the mouthpiece shows and snaps into place
• Hold the diskus in a level, flat position with the mouthpiece toward the patient and slide the lever away from the patient as far as it will go until it clicks. The number on the dose counter will count down by 1; the diskus is now ready to use
• Before inhaling the dose, have patient breathe out as much as possible while holding the diskus level and away from the mouth. The patient should never breathe out into the mouthpiece
• Instruct the patient to put the mouthpiece to the lips and breathe in through the mouth quickly and deeply through the diskus. Remove the diskus from the mouth, hold breath for about 10 sec, and breathe out slowly
• After taking a dose, close the diskus by sliding the thumb grip back as far as it will go. The diskus will click shut. The lever automatically returns to its original position
• The counter displays how many doses are left. The counter number counts

down each time the patient uses the diskus After 55 doses (23 doses from the sample pack), numbers 5 to 0 are red to warn that there are only a few doses left
• After use, patient should rinse mouth with water and spit out the water, not swallow it
• To avoid the spread of infection, do not use the inhaler for more than one person
Intranasal
• Prime before first use
• Shake well before each use
• Rinse tip after use, dry with tissue

SIDE EFFECTS

CNS: Fever, headache, nervousness, dizziness, migraines, numbness in fingers
EENT: *Pharyngitis*, sinusitis, rhinitis, laryngitis, hoarseness, dry eyes, cataracts, nasal discharge, epistaxis
GI: Diarrhea, abdominal pain, nausea, vomiting, *oral candidiasis*, gastroenteritis
GU: UTI
INTEG: Urticaria, dermatitis
META: Hyperglycemia, growth retardation in children, cushingoid features
MISC: Influenza, eosinophilic conditions, angioedema, Churg-Strauss syndrome, anaphylaxis, adrenal insufficiency (high doses), bone mineral density reduction
MS: Osteoporosis, muscle soreness, joint pain
RESP: *Upper respiratory infection*, dyspnea, cough, bronchitis, bronchospasm

PHARMACOKINETICS

Absorption 30% aerosol, 13.5% powder; protein binding 91%; metabolized in liver after absorption in lung; half-life 7.8 hr; <5% excreted in urine and feces
Oral INH: Onset 24 hr, peak several days, duration 1-2 wk

INTERACTIONS

Increase: fluticasone levels—CYP3A4 inhibitors (ketoconazole, itraconazole), darunavir, nelfinavir, ritonavir, amprenavir, fosamprenavir, atazanavir, delavirdine, saquinavir
Increase: tendonitis, tendon rupture—quinolones
Decrease: effects of growth hormones—mecasermin
Drug/Lab Test
Increase: urine/serum glucose

NURSING CONSIDERATIONS

Assess:
• **Respiratory status:** lung sounds, pulmonary function tests during, for several months after change from systemic to inhalation corticosteroids
• Withdrawal symptoms from oral corticosteroids: depression, pain in joints, fatigue
⚠ Adrenal insufficiency: nausea, weakness, fatigue, hypotension, hypoglycemia, anorexia; may occur when changing from systemic to inhalation corticosteroids; may be life-threatening; adrenal function tests periodically: hypothalamic–pituitary–adrenal axis suppression in long-term treatment
• Growth rate in children; blood glucose, serum potassium for all patients
Evaluate:
• Therapeutic response: decreased severity of asthma
Teach patient/family:
• To use bronchodilator 1st, before using inhalation, if taking both
• Not to use for acute asthmatic attack; acute asthma may require oral corticosteroids
• To avoid smoking, smoke-filled rooms, those with URIs, those not immunized against chickenpox or measles
• To rinse mouth after inhaled product to decrease risk of oral candidiasis

fluticasone (topical)

(floo-tic'a-sone)

Cutivate

Func. class.: Corticosteroid, topical

Do not confuse:

fluticasone/mometasone/fludrocortisone

ACTION: Crosses cell membrane to attach to receptors to decrease inflammation, itching; inhibits multiple inflammatory cytokines

USES: Inflammation/itching of corticosteroid-responsive dermatoses on the skin

CONTRAINDICATIONS: Hypersensitivity, monotherapy in primary infections

Precautions: Pregnancy (C), children, breastfeeding, skin infections, skin atrophy

DOSAGE AND ROUTES

• **Adult:** Apply to affected areas bid (cream/ointment) or daily (lotion)

Available forms: Lotion, cream 0.05%, ointment 0.005%

Administer:

Topical route

⚠ Do not use with occlusive dressings

• **Cream/Ointment/Lotion:** Apply sparingly in a thin film and rub gently into the cleansed, affected area

• Reassess treatment after 2 weeks

SIDE EFFECTS

INTEG: Burning, pruritus, dermatitis, hypertrichosis, hives

META: Hyperglycemia, glycosuria

MISC: HPA axis suppression, Cushing syndrome

PHARMACOKINETICS

Duration 10 hr, half life 7 hr

INTERACTIONS

Increase: Blood glucose

NURSING CONSIDERATIONS

Assess:

• Skin reactions: burning, pruritus, dermatitis

Evaluate:

• Decreasing itching, inflammation on the skin

Teach patient/family:

Topical route:

⚠ Not to use with occlusive dressings

• **Cream/Ointment/Lotion:** To apply sparingly in a thin film and rub gently into the cleansed, affected area

• To reassess treatment after 2 weeks

F

fluticasone/salmeterol

(floo-tic'a-sone) (sal-mee'ter-ol)

Advair Diskus, Advair HFA

Func. class.: Corticosteroid, long-acting/β_2-adrenergic agonist

ACTION: Decreased inflammation in inhibiting mast cells, macrophages and leukotrienes; anti-inflammatory and vasoconstrictor properties relaxes bronchial smooth muscles

USES: Maintenance of asthma (long term), COPD

CONTRAINDICATIONS: Hypersensitivity, acute asthma/COPD episodes, severe hypersensitivity to milk proteins

Black Box Warning: Asthma-related deaths

Precautions: Pregnancy (C), breastfeeding, active infections, diabetes mellitus, glaucoma, immunosuppression

DOSAGE AND ROUTES

Asthma maintenance

• **Adult/adolescent ≥12 yr: INH** 1 inhalation of Advair diskus q12hr, or 2 inhalations of Advair HFA q12hr

• **Child 4-11 yr: INH** 1 inhalation of fluticasone 100 mcg/salmeterol 50 mcg (Advair Diskus) q12hr

COPD

• **Adult: INH** 1 inhalation of Advair diskus q12hr

Available forms: Inhalation 100/50, 250/50, 500/50 mcg fluticasone/salmeterol; aerosol spray 45/21, 115/21, 230/21 mcg fluticasone/salmeterol

Administer:

Oral inhalation route

Powder for oral inhalation (Diskus):

• Most children <4 years of age do not generate sufficient inspiratory flow to activate dry powder inhalers

• Give with the Diskus device: Have the patient to open and prepare mouthpiece, slide device lever to activate the first dose, do not advance the lever >1 time; holding the Diskus mouthpiece level to, but away from the mouth, exhale; then put the mouthpiece to the lips and breathe in the dose deeply and slowly; remove the Diskus from the mouth, hold breath for at least 10 sec, and then exhale slowly; close the Diskus, which also resets the dose lever for the next scheduled dose

• Mouth should be rinsed

• Discard device after 1 month or when counter reads 0 (whichever comes first)

HFA aerosol:

• Shake canister; prime the inhaler before first use with 4 test sprays away from face or with 2 test sprays (away from the face) if it has not been used for more than 4 wk, or after dropping

• Rinse mouth with water after use; clean inhaler mouthpiece at least every ?; discard inhaler after 120 sprays or when the counter reads 000

SIDE EFFECTS

CNS: Fever, headache, nervousness, dizziness, migraines, numbness to fingers

EENT: Pharyngitis, sinusitis, rhinitis, laryngitis, hoarseness, dry eyes, cataracts, nasal discharge, epistaxis

GI: Diarrhea, abdominal pain, nausea, vomiting, oral candidiasis, gastroenteritis

GU: UTI

INTEG: Urticaria, dermatitis

META: Hyperglycemia, growth retardation in children, cushingoid features

MISC: Influenza, eosinophilic conditions, angioedema, Churg–Strauss syndrome, anaphylaxis, adrenal insufficiency (high doses), reduced bone mineral density

MS: Osteoporosis, muscle soreness, joint pain

RESP: Upper respiratory infection, dyspnea, cough, bronchitis, bronchospasm

PHARMACOKINETICS

Fluticasone: half-life 8 hr, peak 2 hr
Salmeterol: half-life 5.5 hr, peak 5 min

INTERACTIONS

Increase: Fluticasone levels—CYP3A4 inhibitors (ketoconazole, itraconazole), darunavir, nelfinavir, ritonavir, amprenavir, fosamprenavir, atazanavir, delavirdine, saquinavir

Increase: Tendinitis, tendon rupture—quinolones

Increase: Hypokalemia—loop diuretics, thiazides

Drug/Lab Test

Increase: LFTs

NURSING CONSIDERATIONS

Assess:

Respiratory status: Lung status, pulmonary function tests during, for several months after change from systemic to inhalation corticosteroid

• Withdrawal symptoms from oral corticosteroids: depression, pain in joints, fatigue

Black Box Warning: Adrenal Insufficiency: nausea, weakness, fatigue, hypotension, hypoglycemia, anorexia; can occur when changing from systemic to inhalation corticosteroids; may be life threatening; adrenal function tests periodically: hypothalamic-pituitary-adrenal axis suppression in long-term treatment

- Growth rate in children; blood glucose, serum potassium for all patients

Evaluate:

- Therapeutic response: decreased severity of asthma

Teach patient/family:

- To use bronchodilator first, before using inhalation, if taking both
- Not to use for acute asthmatic attack; acute asthma might require oral corticosteroids
- To avoid smoking, smoke-filled rooms, those with URIs, those not immunized against chickenpox or measles
- To rinse mouth after inhaled product to reduce the risk of oral candidiasis

fluvastatin (Rx)

(flu'vah-stay-tin)

Lescol, Lescol XL

Func. class.: Antilipemic

Chem. class.: HMG-CoA reductase inhibitor

Do not confuse:

fluvastatin/FLUoxetine

ACTION: Inhibits HMG-CoA reductase enzyme, which reduces cholesterol synthesis

USES: As an adjunct for primary hypercholesterolemia (types Ia, Ib), coronary atherosclerosis in CAD; to reduce the risk for secondary prevention of coronary events in patients with CAD; as an adjunct to diet to reduce LDL, total cholesterol, apo B levels in heterozygous familial hyper-cholesterolemia (LDL-C ≥190 mg/dl) or LDL-C ≥160 mg/dl with history of premature CV disease

CONTRAINDICATIONS: Pregnancy (X), breastfeeding, hypersensitivity, active hepatic disease

Precautions: Previous hepatic disease, alcoholism, severe acute infections, trauma, hypotension, uncontrolled seizure disorders, severe metabolic disorders, electrolyte imbalance, myopathy, rhabdomyolysis

DOSAGE AND ROUTES

- **Adult: PO** 20-40 mg/day in PM initially; usual range 20-80 mg, max 80 mg; may be given in 2 doses (40 mg AM, 40 mg PM); dosage adjustments may be made at ≥4-wk intervals

Heterozygous familial hypercholesterolemia

- **Adolescent ≥1 yr postmenarche (10-16 yr): PO** 20 mg daily at bedtime, may increase q6wk, max 40 mg bid (cap) or 80 mg (ext rel)

Available forms: Caps 20, 40 mg; ext rel tab 80 mg

Administer:

- Do not break, crush, or chew ext rel tabs, use at any time of day (tab), in the evening (cap)
- Bile acid sequestrant should be given at least 4 hr before fluvastatin
- Give without regard to food
- Store at room temperature, protected from light

SIDE EFFECTS

CNS: Headache, dizziness, insomnia

EENT: Lens opacities

GI: *Abdominal pain, cramps, nausea, constipation, diarrhea, dyspepsia, flatus,* hepatic dysfunction, pancreatitis

HEMA: Thrombocytopenia, hemolytic anemia, leukopenia

INTEG: Rash, pruritus

MISC: Fatigue, influenza, photosensitivity

MS: Myalgia, myositis, rhabdomyolysis, *arthritis, arthralgia*

RESP: *Upper respiratory infection,* rhinitis, cough, pharyngitis, sinusitis, bronchitis

PHARMACOKINETICS

Peak response 3-4 wk, metabolized in liver, >98% protein bound, excreted primarily in feces, enters breast milk, half-life 1.2 hr, steady state 4-5 wk

INTERACTIONS

Increase: effects of warfarin, digoxin, phenytoin

Increase: myopathy—cycloSPORINE, niacin, colchicine, protease inhibitors, fibric acid derivatives

Increase: effects of fluvastatin—alcohol, cimetidine, ranitidine, omeprazole, phenytoin

Decrease: fluvastatin effect—cholestyramine, colestipol, separate by ≥4 hr

Drug/Herb

Increase: adverse reactions—red yeast rice

Drug/Food

- Grapefruit juice: possible increased toxicity

Drug/Lab Test

Increase: LFTs, CK

Decrease: platelets, WBC

NURSING CONSIDERATIONS

Assess:

- **Hypercholesterolemia:** diet history: fats, fasting lipid profile (cholesterol, LDL, HDL, TG) before and q4-6wk, then q3-6mo when stable
- **Hepatotoxicity/pancreatitis:** monitor hepatic studies before, q12wk after dosage change, then q6mo; AST, ALT, LFTs may be increased
- Renal studies in patients with compromised renal system: BUN, I&O ratio, creatinine

⚠ **Myopathy, rhabdomyolysis:** muscle pain, tenderness; obtain baseline CPK if elevated; if these occur, product should be discontinued

Evaluate:

- Therapeutic response: decrease in sLDL, VLDL, total cholesterol; increased HDL, decreased triglycerides, slowing of CAD

Teach patient/family:

- That blood work will be necessary during treatment; to take product as prescribed, that effect may take ≥4 wk
- To report severe GI symptoms, headache, muscle pain, weakness, tenderness
- That previously prescribed regimen will continue: low-cholesterol diet, exercise program, smoking cessation
- To report suspected pregnancy; not to use during pregnancy (X), breastfeeding
- To take without regard to meals; take immediate release product in the evening, separate by ≥4 hr from bile-acid product

fluvoxaMINE (Rx)

(flu-vox'a-meen)

Luvox CR

Func. class.: Antidepressant SSRI (selective serotonin reuptake inhibitor)

Do not confuse:

Luvox/Levoxyl/Lasix/Lovenox

FluvoxaMINE/FLUoxetine/FluPHENAZine

ACTION: Inhibits CNS neuron uptake of serotonin but not of norepinephrine

USES: Obsessive-compulsive disorder, social phobia

Unlabeled uses: Depression, bulimia nervosa, panic disorder, autism, anxiety, posttraumatic stress disorder (PTSD), premenstrual dysphoric disorder (PMDD)

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (C), breastfeeding, geriatric patients, hepatic/cardiac disease, abrupt discontinuation, dehydration, ECT, hyponatremia, hypovolemia, bipolar disorder, seizure disorder

Black Box Warning: Children <8 yr, suicidal ideation

DOSAGE AND ROUTES

Obsessive-compulsive disorder (OCD)

- **Adult: PO** 50 mg at bedtime, increase by 50 mg at 4-7 day intervals, max 300 mg; doses over 100 mg should be divided; **EXT REL** 100 mg at bedtime, may

titrate upward by 50 mg/wk, max 300 mg/day
• **Child 12-17 yr: PO** 25 mg at bedtime, increase by 25 mg/day q4-7days, max 300 mg/day; doses over 50 mg should be divided
• **Child 8-11 yr: PO** 25 mg/day at bedtime, may increase q4-7days, max 200 mg/day

Social anxiety disorder
• **Adult: PO EXT REL CAP** (Luvox CR) 100 mg at bedtime initially, titrate as needed by 50 mg/wk to 100-300 mg/day; **PO** 50 mg at bedtime, titrate as needed by 50 mg q4-7days to 50-300 mg/day
• **Child/adolescent 12-17 yr: PO** 25 mg at bedtime, titrate by 25-50 mg q4-7days, max 300 mg/day; if total daily dose >50 mg, divide equally

Hepatic dose/geriatric
• **Adult: PO** 25 mg at bedtime, may titrate upward slowly

Autism (unlabeled)
• **Adult: PO** up to 150 mg/day

Bulimia nervosa, depression (unlabeled)
• **Adult: PO** 50 mg at bedtime × 4-7 days, titrate by 25-50 mg/dose q4-7days as needed

Premenstrual dysphoric disorder (unlabeled)
• **Adult: PO** 50 mg/day, may titrate to 100 mg/day

Schizophrenia (unlabeled)
• **Adult: PO** 100 mg daily in combination with other agents

Posttraumatic stress disorder (PTSD) (unlabeled)
• **Adult: PO** 25-50 mg at bedtime × 4-7 days then titrate by 25-50 mg/dose q4-7days, range 25-300 mg/day single or divided dose × 3-12 wk

Available forms: Tabs 25, 50, 100 mg; ext rel cap 100, 150 mg

Administer:
• With food, milk for GI symptoms
• **Immediate release:** give at bedtime; doses >100 mg/day (or >50 mg/day in dose aged 8-17 yr) in 2 divided doses; if doses are not equal, give larger dose at bedtime
• **Ext rel:** give at bedtime; do not break, crush, chew ext rel product

SIDE EFFECTS

CNS: *Headache, drowsiness, dizziness, seizures,* sleep disorders, insomnia, suicidal ideation (children/adolescents), neuroleptic malignant syndrome–like reactions, *weakness*
GI: *Nausea, anorexia, constipation,* hepatotoxicity, *vomiting, diarrhea,* dry mouth
GU: *Decreased libido,* anorgasmia
INTEG: *Rash, sweating*

PHARMACOKINETICS

Crosses blood-brain barrier, 77% protein binding, metabolism by the liver, terminal half-life 15.6 hr, peak 2-8 hr

INTERACTIONS

⚠ Fatal reaction—MAOIs
Increase: CNS depression—alcohol, barbiturates, benzodiazepines
Increase: effect of—ramelteon, thioridazine; do not use together
⚠ **Increase:** QT prolongation, death—pimozide, do not use together
Increase: fluvoxaMINE, toxicity levels—tricyclics, cloZAPine, alosetron, tiZANidine; do not use together
Increase: metabolism, decrease effects—smoking
Increase: serotonin syndrome, neuroleptic malignant syndrome: SSRIs, SNRIs, serotonin-receptor agonists, atypical antipsychotics
Increase: bleeding risk—anticoagulants, NSAIDs, salicylates, thrombolytics
• Avoid use with clopidogrel
Decrease: metabolism, increase action of propranolol, diazepam, lithium, theophylline, carBAMazepine, warfarin

Drug/Herb
Increase: CNS effect—kava, valerian
Increase: serotonin syndrome—tryptophan, St. John's wort; do not use together

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NURSING CONSIDERATIONS

Assess:
- Hepatic studies: AST, ALT, bilirubin
- Mental status: mood, sensorium, affect, **suicidal tendencies;** increase in psychiatric symptoms: depression, panic, obsessive-compulsive symptoms
- Constipation; most likely in geriatric patients

⚠ For toxicity: nausea, vomiting, diarrhea, syncope, increased pulse, seizures

Perform/provide:
- Storage at room temp; do not freeze

Evaluate:
- Therapeutic response: decrease in depression

Teach patient/family:
- That therapeutic effects may take 2-3 wk
- To use caution when driving, performing other activities requiring alertness because drowsiness, dizziness may occur
- Not to use other CNS depressants, alcohol, barbiturates, benzodiazepines, St. John's wort, kava
- To notify prescriber if pregnancy is suspected, planned
- To notify prescriber of allergic reaction
- To increase bulk in diet if constipation occurs, especially in geriatric patients

Black Box Warning: That suicidal thoughts/behaviors may occur

- To stop taking MAOIs at least 14 days before starting product

TREATMENT OF OVERDOSE:

Activated charcoal, gastric lavage

folic acid (vit B_9) (OTC)

(foe'lik a'sid)

Equaline Folic Acid, Folacin, Vitamin B_9, Walgreens Gold Seal Folic Acid

Func. class.: Vit B complex group, water-soluble vitamin

ACTION: Needed for erythropoiesis; increases RBC, WBC, platelet formation with megaloblastic anemias

USES: Megaloblastic or macrocytic anemia caused by folic acid deficiency, hepatic disease, alcoholism, hemolysis, intestinal obstruction, pregnancy to reduce risk for neural tube defects

Unlabeled uses: Reduce risk for heart disease, stroke, methotrexate toxicity prophylaxis

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (A), anemias other than megaloblastic/macrocytic anemia, vit B_{12} deficiency anemia, uncorrected pernicious anemia

DOSAGE AND ROUTES

RDA
- **Adult and child ≥14 yr: PO** 400 mcg
- **Adult (pregnant/lactating): PO** 600 mcg/day
- **Child 9-13 yr: PO** 300 mcg
- **Child 4-8 yr: PO** 200 mcg
- **Child 1-3 yr: PO** 150 mcg
- **Infant 6 mo-1 yr: PO** 80 mcg
- **Neonate/infant <6 mo: PO** 65 mcg

Megaloblastic/macrocytic anemia due to folic acid or nutritional deficiency
- **Pregnant/lactating: PO** 800-1000 mcg

Therapeutic dose
- **Adult and child: PO/IM/SUBCUT/IV** up to 1 mg/day

Maintenance dose
- **Adult and child >4 yr: PO/IM/SUBCUT/IV** 0.4 mg/day

• **Pregnant and lactating: PO/IM/SUBCUT/IV** 0.8-1 mg/day
• **Child <4 yr: PO/IM/SUBCUT/IV** up to 0.3 mg/day
• **Infant: PO/IM/SUBCUT/IV** up to 0.1 mg/day

Prevention of neural tube defects during pregnancy
• **Adult: PO** 0.6 mg/day

Prevention of megaloblastic anemia during pregnancy
• **Adult: PO/IM/SUBCUT** up to 1 mg/day during pregnancy

Tropical sprue
• **Adult: PO** 3-15 mg/day

Available forms: Tabs 0.1, 0.4, 0.8, 1, 5 mg; inj 5, 10 mg/ml

Administer:

SUBCUT route
• Do not inject intradermally

IM route
• Inject deeply in large muscle mass, aspirate

Direct IV route
• Direct undiluted ≤5 mg/1 min or more

Continuous IV INF route
• May be added to most IV sol or TPN

Y-site compatibilities: Alfentanil, aminophylline, ascorbic acid injection, atracurium, atropine, azaTHIOprine, aztreonam, benztropine, bumetanide, calcium gluconate, cefamandole, ceFAZolin, cefmetazole, cefonicid, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, ceftAZidime, ceftizoxime, cefTRIAXone, cefuroxime, cephalothin, cephapirin, chloramphenicol, cimetidine, clindamycin, cyanocobalamin, cycloSPORINE, dexamethasone, digoxin, diphenhydrAMINE, DOPamine, enalaprilat, EPHEDrine, EPINEPHrine, epoetin alfa, erythromycin, esmolol, famotidine, fentaNYL, fluconazole, furosemide, ganciclovir, glycopyrrolate, heparin, hydrocortisone, hydrOXYzine, imipenem-cilastatin, indomethacin, insulin (regular), ketorolac, labetalol, lidocaine, LR, magnesium sulfate, mannitol, meperidine, methicillin, methylPREDNISolone, metoclopramide, metoprolol, mezlocillin, midazolam, moxalactam, multiple vitamins injection, naloxone, nitroglycerin, nitroprusside, ondansetron, oxacillin, oxytocin, penicillin G potassium/sodium, PENTobarbital, PHENobarbital, phenylephrine, phytonadione, piperacillin, potassium chloride, procainamide, propranolol, ranitidine, Ringer's, ritodrine, sodium bicarbonate, succinylcholine, SUFentanil, theophylline, ticarcillin, ticarcillin-clavulanate, TPN, trimetaphan, urokinase, vancomycin, vasopressin

SIDE EFFECTS

CNS: Confusion, depression, excitability, irritability
GI: Anorexia, nausea
INTEG: Pruritus, rash, erythema
RESP: Bronchospasm
SYST: Anaphylaxis (rare)

PHARMACOKINETICS

PO: Peak $^1/_2$-1 hr, bound to plasma proteins, excreted in breast milk, metabolized by liver, excreted in urine (small amounts)

INTERACTIONS

Increase: need for folic acid—estrogen, hydantoins, carBAMazepine, glucocorticoids
Decrease: folate levels—methotrexate, sulfonamides, sulfaSALAzine, trimethoprim
Decrease: phenytoin levels, fosphenytoin, may increase seizures

NURSING CONSIDERATIONS

Assess:
• Megaloblastic anemia: fatigue, dyspnea, weakness
• Hgb, Hct, reticulocyte count
• Nutritional status: bran, yeast, dried beans, nuts, fruits, fresh vegetables, asparagus
• Products currently taken: estrogen, carBAMazepine, glucocorticoids, hydantoins; these products may cause increased folic acid use by body and con-

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tribute to a deficiency if taking other neurotoxic products

Perform/provide:

• Storage in light-resistant container

Evaluate:

• Therapeutic response: increased weight, oriented, well-being; absence of fatigue; increase in reticulocyte count within 5 days of beginning treatment, absence of neural tube defect

Teach patient/family:

• To take product exactly as prescribed; that periodic lab work is required

• To alter nutrition to include high–folic-acid foods: organ meats, vegetables, fruit

• That urine will turn bright yellow

• To notify prescriber of allergic reaction

• To avoid breastfeeding

⚠ HIGH ALERT

fondaparinux (Rx)

(fon-dah-pair'ih-nux)

Arixtra

Func. class.: Anticoagulant, antithrombotic

Chem. class.: Synthetic, selective factor Xa inhibitor

Do not confuse:

Arixtra/Anti-Xa

ACTION: Acts by antithrombin III (ATIII)-mediated selective inhibition of factor Xa; neutralization of factor Xa interrupts blood coagulation and inhibits thrombin formation; does not inactivate thrombin (activated factor II) or affect platelets

USES: Prevention/treatment of deep venous thrombosis, PE in hip and knee replacement, hip fracture or abdominal surgery

Unlabeled uses: Acute coronary syndrome

CONTRAINDICATIONS: Hypersensitivity to this product; hemophilia, leukemia with bleeding, peptic ulcer disease, hemorrhagic stroke, surgery, thrombocytopenic purpura, weight <50 kg, severe renal disease (CCr <30 ml/min), active major bleeding, bacterial endocarditis

Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, alcoholism, hepatic disease (severe), blood dyscrasias, heparin-induced thrombocytopenia, uncontrolled severe hypertension, subacute bacterial endocarditis, acute nephritis, mild to moderate renal disease

Black Box Warning: Spinal/epidural anesthesia, lumbar puncture

DOSAGE AND ROUTES

Deep venous thrombosis/PE

• **Adult <50 kg: SUBCUT** 5 mg/day × ≥5 days until INR 2-3; may give warfarin within 72 hr of fondaparinux

• **Adult 50-100 kg: SUBCUT** 7.5 mg/day × ≥5 days until INR 2-3; may give warfarin within 72 hr of fondaparinux

• **Adult >100 kg: SUBCUT** 10 mg/day × ≥5 days until INR 2-3; may give warfarin within 72 hr of fondaparinux

Prevention of deep venous thrombosis

• **Adult: SUBCUT** 2.5 mg/day given 6 hr after surgery; continue for 5-9 days; for hip surgery, up to 32 days; for abdominal surgery, up to 24 days

Coronary artery thrombosis prophylaxis/acute coronary syndrome (unlabeled)

• **Adult: SUBCUT** 2.5 mg until hospital discharge or ≤8 days with standard treatment

Renal disease

• **Adult: SUBCUT** CCr <30 ml/min, do not use

Available forms: Inj 2.5 mg/0.5 ml, 5 mg/0.4 ml, 7.5 mg/0.6 ml, 10 mg/0.8 ml prefilled syringes

Administer:

- Alone; do not mix with other products or solutions; cannot be used interchangeably (unit to unit) with other anticoagulants
- For 5-9 days
- Only after screening patient for bleeding disorders

SUBCUT route

- SUBCUT only; do not give IM; do not give <6 hr after surgery
- Check for discolored sol or sol with particulate; if present, do not give
- Administer 6-8 hr after surgery; administer to recumbent patient, rotate inj sites (left/right anterolateral, left/right posterolateral abdominal wall)
- Wipe surface of inj site with alcohol swab, twist plunger cap and remove, remove rigid needle guard by pulling straight off needle; do not aspirate, do not expel air bubble from surface
- Insert whole length of needle into skinfold held with thumb and forefinger
- When product is injected, a soft click may be felt or heard
- Give at same time each day to maintain steady blood levels; observe inj site
- Avoid all IM inj that may cause bleeding

Administer only this product when ordered; not interchangeable with heparin

SIDE EFFECTS

CNS: *Fever*, confusion, headache, dizziness, *insomnia*
GI: *Nausea, vomiting*, diarrhea, dyspepsia, *constipation*, increased AST, ALT
GU: UTI, urinary retention
HEMA: *Anemia*, minor bleeding, purpura, hematoma, thrombocytopenia, **major bleeding (intracranial, cerebral, retroperitoneal hemorrhage), postoperative hemorrhage, heparin-induced thrombocytopenia**
INTEG: Increased wound drainage, bullous eruption, local reaction—*rash*, pruritus, inj site bleeding
META: Hypokalemia
OTHER: Hypotension, pain, *edema*

PHARMACOKINETICS

Rapidly, completely absorbed; peak steady state 3 hr; distributed primarily in blood; does not bind to plasma proteins except 94% to ATIII; metabolism unknown; eliminated unchanged in urine within 72 hr with normal renal function; terminal half-life 17-21 hr

INTERACTIONS

Increase: bleeding risk—salicylates, NSAIDs, abciximab, eptifibatide, tirofiban, clopidogrel, dipyridamole, quiNIDine, valproic acid

Drug/Herb

Increase: bleeding risk—feverfew, garlic, ginger, ginkgo, ginseng, green tea, horse chestnut, kava

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Monitor patients who have received epidural/spinal anesthesia or lumbar puncture for neurological impairment

- Blood studies (CBC, anti-Xa, Hgb/Hct, prothrombin time, platelets, occult blood in stools), thrombocytopenia may occur; if platelets $<100{,}000/mm^3$, treatment should be discontinued; renal studies: BUN, creatinine
- For bleeding: gums, petechiae, ecchymosis, black tarry stools, hematuria; decreased Hct, notify prescriber
- For risk of hemorrhage if coadministering with other products that may cause bleeding
- For hypersensitivity: rash, fever, chills; notify prescriber

Perform/provide:

- Storage at 77° F (25° C); do not freeze

Evaluate:

- Therapeutic response: prevention of DVT

Teach patient/family:

- To use soft-bristle toothbrush to avoid bleeding gums; to use electric razor
- To report any signs of bleeding: gums, under skin, urine, stools

• To avoid OTC products containing aspirin, NSAIDs

formoterol (Rx)

(for-moh'ter-ahl)

Foradil Aerolizer, Oxeze ♣, Perforomist

Func. class.: Bronchodilator

Chem. class.: β-Adrenergic agonist

Do not confuse:
Foradil/Toradol

ACTION: Has β_1 and β_2 action; relaxes bronchial smooth muscle and dilates the trachea and main bronchi by increasing levels of cAMP, which relaxes smooth muscles; causes increased contractility and heart rate by acting on β-receptors in heart

USES: Maintenance, treatment of asthma, COPD; prevention of exercise-induced bronchospasm

CONTRAINDICATIONS: Hypersensitivity to sympathomimetics, monotherapy for asthma, COPD, status asthmaticus

Precautions: Pregnancy (C), geriatric patients, cardiac disorders, hyperthyroidism, diabetes mellitus, prostatic hypertrophy, hypertension, African descendants, aneurysm

Black Box Warning: Asthma-related death

DOSAGE AND ROUTES

Maintenance, treatment of asthma

• **Adult and child ≥5 yr: INH** AM and PM long-term 1 cap (12 mcg) q12hr using aerolizer inhaler

Maintenance of COPD

• **Adult: INH** 12 mcg q12hr

Prevention of exercise-induced bronchospasm

• **Adult and child ≥12 yr: INH** prn occasionally 1 cap (12 mcg) ≥15 min before exercise, do not use additional doses for ≥12 hr

Available form: INH powder in cap 12 mcg; nebulizer sol for INH 20 mcg/2 ml

Administer:

Inhalation route

• Place cap in aerolizer inhaler; cap is punctured; do not wash aerolizer inhaler

• Pull off cover, twist mouthpiece to open, push buttons in; make sure the 4 pins are visible; remove cap from blister pack, place cap in chamber; twist to close, press (a click will be heard), release; patient should exhale, place inhaler in mouth, inhale rapidly

SIDE EFFECTS

CNS: *Tremors, anxiety*, insomnia, headache, dizziness, stimulation

CV: Palpitations, tachycardia, hypertension, chest pain

GI: Nausea, vomiting, xerostomia

RESP: Bronchial irritation, dryness of oropharynx, bronchospasms (overuse), infection, inflammatory reaction (child)

PHARMACOKINETICS

Onset 15 min; peak 1-3 hr; duration 12 hr; metabolized in liver, lungs, GI tract; half-life 10 hr

INTERACTIONS

Increase: serious dysrhythmias—MAOIs, tricyclics

Increase: hypokalemia—loop/thiazide diuretics

Increase: effects of both products—other sympathomimetics, thyroid hormones

Increase: QT prolongation—class IA/III antiarrhythmics, phenothiazines, pimozide, haloperidol, risperiDONE, sertindole, ziprasidone, amoxapine, arsenic trioxide, chloroquine, clarithromycin, dasatinib, dolasetron, droperidol, erythromycin, halofantrine, halogenated anesthetics, levomethadyl, maprotiline, methadone, some quinolones, ondansetron, paliperidone, palonosetron, pentamidine, probu-

col, ranolazine, SUNItinib, tricyclics, vorinostat
Decrease: action when used with β-blockers

NURSING CONSIDERATIONS

Assess:
• Respiratory function: B/P, pulse, lung sounds; note sputum color, character; respiratory function tests before, during treatment
• Cardiac status: hypertension, palpitations, tachycardia
• For paresthesias, coldness of extremities; peripheral blood flow may decrease
Perform/provide:
• Storage at room temp; protection from heat, moisture
Evaluate:
• Therapeutic response: ease of breathing
Teach patient/family:
Black Box Warning: Asthma-related death, severe asthma exacerbations; if wheezing worsens and cannot be relieved during an acute asthma attack, immediate medical attention should be sought
• To rinse mouth after use
• About correct use of inhaler/nebulizer (review package insert with patient); to avoid getting aerosol in eyes
• About all aspects of product; to avoid smoking, smoke-filled rooms, persons with respiratory infections; not to swallow caps

TREATMENT OF OVERDOSE:

Administration of β-blocker

fosamprenavir (Rx)

(fos-am-pren'a-veer)
Lexiva, Telzir ✤
Func. class.: Antiretroviral
Chem. class.: Protease inhibitor

ACTION: A prodrug of amprenavir; inhibits human immunodeficiency virus (HIV) protease, which prevents maturation of the infectious virus

USES: HIV-1 infection in combination with antiretrovirals

CONTRAINDICATIONS: Hypersensitivity to protease inhibitors
Precautions: Pregnancy (C), breastfeeding, geriatric patients, hepatic disease, hemolytic anemia, diabetes, sulfa sensitivity, autoimmune disease with immune reconstitution

DOSAGE AND ROUTES

Therapy-naive patients
• **Adult: PO** 1400 mg bid without ritonavir or fosamprenavir 1400 mg/day and with ritonavir 200 mg/day or fosamprenavir 700 mg bid and ritonavir 100 mg bid
• **Infant/child ≥4 wk, adolescents: PO** 30 mg/kg bid max 1400 mg/dose, without ritonavir
Protease-experienced patients (PI)
• **Adult: PO** 700 mg bid and ritonavir 100 mg bid
• **Child/adolescent ≥20 kg: PO** 18 mg/kg bid with ritonavir 3 mg/kg bid
• **Child/adolescent 15 kg to <20 kg: PO** 23 mg/kg bid with ritonavir 3 mg/kg bid
• **Child/adolescent 11 kg to <15 kg: PO** 30 mg/kg bid with ritonavir 3 mg/kg bid
• **Child/adolescent <11 kg: PO** 45 mg bid with ritonavir 7 mg bid
• **Infant ≥6 mo: 15 kg to <20 kg: PO** susp 23 mg/kg bid with ritonavir 3 mg/kg bid
• **Infant ≥6 mo: 11 kg to <15 kg: PO** susp 30 mg/kg bid with ritonavir 3 mg/kg bid
• **Infant ≥6 mo: <11 kg: PO** susp 45 mg/kg bid with ritonavir 7 mg/kg bid
Combination with efavirenz
• **Adult: PO** add another 100 mg/day of ritonavir for a total of 300 mg/day when all 3 products given
Hepatic dose
• **Adult: PO** (Child-Pugh 5-6) 700 mg bid without ritonavir (treatment-naive pa-

tients) or 700 mg bid with ritonavir 100 mg daily (treatment-naive or experienced patients); (Child-Pugh 7-9) 700 mg bid without ritonavir (treatment-naive patients) or 450 mg bid with ritonavir 100 mg daily (treatment-naive or experienced patients); (Child-Pugh 10-15) 350 mg bid without ritonavir (treatment-naive patients) or 300 mg bid with ritonavir 100 mg daily (treatment-naive or experienced patients)

Available forms: Tabs 700 mg (equivalent to 600 mg amprenavir); oral susp 50 mg/ml

Administer:

- **Tab:** without regard to food
- **Oral susp:** give without food (adult), with food (pediatric); if vomiting occurs within 30 min of dose, readminister; shake vigorously before dose, use calibrated device

SIDE EFFECTS

CNS: Headache, fatigue, depression, oral paresthesia

GI: *Nausea, diarrhea, vomiting, abdominal pain*

INTEG: Rash, pruritus

MISC: Redistribution or accumulation of body fat, hyperglycemia, Stevens-Johnson syndrome

PHARMACOKINETICS

Prodrug of amprenavir, peak 1½-4 hr; 90% protein binding; metabolized in liver by cytochrome P4503AY (CYP3A4); excretion of unchanged product minimal; half-life 7.7 hr

INTERACTIONS

Increase: effect of—warfarin

⚠ **Serious life-threatening reactions:** amiodarone, calcium channel blockers, lidocaine, pimozide, ergots, midazolam, triazolam, flecainide, lovastatin, simvastatin, propafenone

Increase: effect of—ARIPiprazole, rifbutin, ketoconazole, itraconazole, sildenafil, vardenafil

Increase: toxicity—HMG-CoA reductase inhibitors

Decrease: effect of oral contraceptives, methadone

Decrease: fosamprenavir levels—nevirapine, antacids, efavirenz, saquinavir, ranitidine, carBAMazepine, phenytoin, lopinavir/ritonavir, barbiturates, proton-pump inhibitors, H_2-receptor antagonists, dexamethasone; avoid concurrent use

Drug/Herb

- Avoid use with St. John's wort

Drug/Lab Test

Increase: serum glucose, AST, ALT, triglycerides

NURSING CONSIDERATIONS

Assess:

- **HIV:** monitor CD4 + T cell count, plasma HIV RNA, serum cholesterol, serum lipid profile
- Bowel pattern before, during treatment; monitor hydration
- Skin eruptions, rash, urticaria, itching; allergy to sulfonamides; cross-sensitivity may occur

⚠ Stevens-Johnson syndrome; skin reactions, report immediately

- **Immune reconstitution syndrome:** may occur with combination antiretroviral therapy, autoimmune disease may also develop, up to months after treatment starts

Teach patient/family:

- To avoid taking with other medications unless directed by provider
- That product does not cure but does manage symptoms; that product does not prevent transmission of HIV to others
- To use a nonhormonal form of birth control while taking this product
- That if dose is missed, to take as soon as remembered up to 1 hr before next dose; not to double dose
- Not to alter dose or stop therapy without talking to physician
- To advise physician if patient has sulfa allergy
- To report all medications, including herbal supplements, to physician

• That patients receiving phosphodiesterase type 5 inhibitors may be at increased risk for PDE5 inhibitor adverse effects

foscarnet (Rx)

(foss-kar'net)

Foscavir

Func. class.: Antiviral

Chem. class.: Inorganic pyrophosphate organic analog

ACTION: Antiviral activity is produced by selective inhibition at the pyrophosphate binding site on virus-specific DNA polymerases and reverse transcriptases at concentrations that do not affect cellular DNA polymerases

USES: Treatment of CMV retinitis, HSV infections; used with ganciclovir for relapsing patients

CONTRAINDICATIONS: Hypersensitivity, CCr <0.4 ml/min/kg

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, seizure disorders, severe anemia

Black Box Warning: Renal disease, electrolyte/mineral imbalances

DOSAGE AND ROUTES

Acyclovir-resistant mucocutaneous herpes simplex virus infection (herpes labialis, herpes febrilis, herpes genitalis) in HIV-infected patients

• **Adult/adolescent (unlabeled): IV** 40 mg/kg every 8–12 hr × 2–3 wk or until lesions are healed

Cytomegalovirus (CMV) encephalitis (unlabeled); CMV neurological disease (unlabeled) (including encephalitis) in HIV-infected patients

• **Adult/adolescent: IV** 90 mg/kg every 12 hr or 60 mg/kg every 8 hr × 3 wk (or until symptomatic improvement) with ganciclovir 5 mg/kg IV every 12 hr × 2–3 wk

Encephalitis (unlabeled) caused by human herpesvirus 6 (HHV-6) in immunocompromised patients

• **Adult: IV** 60 mg/kg every 8 hr or 90 mg/kg every 12 hr alone or in combination with ganciclovir 5 mg/kg IV every 12 hr

CMV retinitis or disseminated disease (unlabeled) in HIV-infected patients, recurrent or relapsed CMV retinitis in HIV-infected patients

• **Adult: IV** Induction with 90 mg/kg every 12 hr or 60 mg/kg IV every 8 hr × 14–21 days, depending upon the clinical response

Renal dose

• HSV induction dosage equivalent to 80 mg/kg/day (40 mg/kg IV every 12 hr)

• **Adult: IV** CCr >1.4 ml/min/kg: No change; CCr > 1–1.4 ml/min/kg: Decrease to 30 mg/kg every 12 hr; CCr >0.8–1 ml/min/kg: Decrease to 20 mg/kg every 12 hr; CCr >0.6–0.8 ml/min/kg: Decrease to 35 mg/kg every 24 hr; CCr >0.5–0.6 ml/min/kg: Decrease to 25 mg/kg every 24 hr; CCr ≥0.4–0.5 ml/min/kg: Decrease to 20 mg/kg every 24 hr; CCr <0.4 ml/min/kg: Not recommended

HSV induction dosage equivalent to 120 mg/kg/day (40 mg/kg IV every 8 hr)

• **Adult: IV** CCr >1.4 ml/min/kg: No change; CCr >1–1.4 ml/min/kg: Decrease to 30 mg/kg every 8 hr; CCr >0.8–1 ml/min/kg: Decrease to 35 mg/kg every 12 hr; CCr >0.6–0.8 ml/min/kg: Decrease to 25 mg/kg every 12 hr; CCr 0.5–0.6 ml/min/kg: Decrease to 40 mg/kg every 24 hr; CCr ≥0.4–0.5 ml/min/kg: Decrease to 35 mg/kg every 24 hr; CCr <0.4 ml/min/kg: Not recommended

CMV induction dosage equivalent to 180 mg/kg/day (60 mg/kg every 8 hr)

• **Adult: IV** CCr >1.4 ml/min/kg: No change; CCr >1–1.4 ml/min/kg: Decrease to 45 mg/kg every 8 hr; CCr

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>0.8–1 ml/min/kg: Decrease to 50 mg/kg every 12 hr; CCr >0.6–0.8 ml/min/kg: Decrease to 40 mg/kg every 12 hr; CCr >0.5–0.6 ml/min/kg: Decrease to 60 mg/kg every 24 hr; CCr ≥0.4–0.5 ml/min/kg: Decrease to 50 mg/kg every 24 hr; CCr <0.4 ml/min/kg: Not recommended

CMV induction dosage equivalent to 180 mg/kg/day (90 mg/kg IV every 12 hr)

• **Adult: IV** CCr >1.4 ml/min/kg: No change; CCr >1–1.4 ml/min/kg: Decrease to 70 mg/kg every 12 hr; CCr >0.8–1 ml/min/kg: Decrease to 50 mg/kg every 12 hr; CCr >0.6–0.8 ml/min/kg: Decrease to 80 mg/kg every 24 hr; CCr >0.5–0.6 ml/min/kg: Decrease to 60 mg/kg every 24 hr; CCr ≥0.4–0.5 ml/min/kg: Decrease to 50 mg/kg every 24 hr; CCr <0.4 ml/min/kg: Not recommended

Available forms: Inj 6000 mg/250 ml, 12,000 mg/500 ml (24 mg/ml)

Administer:

• Increased fluids before and during product administration to induce diuresis, minimize renal toxicity

Intermittent IV INF route

• Using inf device at no more than 1 mg/kg/min; do not give by rapid or bolus IV; give by CVP or peripheral vein; standard 24 mg/ml sol may be used without dilution if using by CVP; dilute the 24 mg/ml sol to 12 mg/ml with D_5W or NS if using peripheral vein

• Manufacturer recommends product not be given with other medications in syringe or admixed

SIDE EFFECTS

CNS: *Fever*, dizziness, *headache*, seizures, *fatigue*, neuropathy, asthenia, encephalopathy, malaise, meningitis, *paresthesia*, depression, *confusion*, *anxiety*

CV: ECG abnormalities, 1st-degree AV block, nonspecific ST-T segment changes, cerebrovascular disorder, cardiomyopathy, cardiac arrest, atrial fibrillation, CHF, sinus tachycardia

GI: *Nausea*, *vomiting*, *diarrhea*, *anorexia*, abdominal pain, pancreatitis

GU: Acute renal failure, decreased CCr, increased serum creatinine, azotemia, diabetes insipidus, renal tubular disorders

HEMA: *Anemia*, granulocytopenia, leukopenia, thrombocytopenia, thrombosis, neutropenia, lymphadenopathy

INTEG: *Rash*, sweating, pruritus, skin discoloration

RESP: *Coughing*, *dyspnea*, pneumonia, pulmonary infiltration, pneumothorax, hemoptysis

SYST: *Hypokalemia*, *hypocalcemia*, *hypomagnesemia*; hypophosphatemia

PHARMACOKINETICS

14%-17% protein bound, half-life 18-88 hr in normal renal function, 79%-92% excreted via kidneys

INTERACTIONS

Black Box Warning: Increase: nephrotoxicity—acyclovir, cidofovir, CISplatin, gold compounds, penicillamine, tacrolimus, tenofovir, vancomycin, aminoglycosides, amphotericin B, NSAIDs, lithium, cycloSPORINE

Increase: hypocalcemia—pentamidine

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Renal tubular disorders: I&O ratio, urine pH, serum creatinine at baseline, 3×/wk during initial therapy then 2×/wk thereafter; CCr at baseline, throughout treatment; if CCr <0.4 ml/min/kg, discontinue

• Blood counts q2wk; watch for decreasing granulocytes, Hgb; if low, therapy may have to be discontinued and restarted after hematologic recovery; blood transfusions may be required

• Lesions in HSV

• Electrolytes and minerals (calcium, phosphate, magnesium, potassium); watch closely for tetany during 1st administration

• GI symptoms: nausea, vomiting, diarrhea; severe symptoms may necessitate discontinuing product
⚠ **Blood dyscrasias** (anemia, granulocytopenia): bruising, fatigue, bleeding, poor healing
• **Allergic reactions:** flushing, rash, urticaria, pruritus
CMV retinitis
• Culture should be performed prior to treatment (blood, urine, throat); a negative culture does not rule out CMV
• Ophthalmic exam should confirm diagnosis
Perform/provide:
• Close monitoring during therapy for tingling, numbness, paresthesias; if these occur, stop inf, obtain lab sample for electrolytes
Evaluate:
• Therapeutic response: improvement in CMV retinitis
Teach patient/family:
• To call prescriber if sore throat, swollen lymph nodes, malaise, fever occur, since other infections may occur
• To report perioral tingling, numbness in extremities, and paresthesias
• That serious product interactions may occur if OTC products are ingested; check first with prescriber
• That product is not a cure but will control symptoms

fosinopril (Rx)

(foss'in-oh-pril)

Monopril

Func. class.: Antihypertensive

Chem. class.: Angiotensin-converting enzyme (ACE) inhibitor

Do not confuse:
Monopril/minoxidil/Accupril/Monoket

ACTION: Selectively suppresses renin-angiotensin-aldosterone system; inhibits ACE; prevents conversion of angiotensin I to angiotensin II; results in dilation of arterial, venous vessels

USES: Hypertension, alone or in combination with thiazide diuretics, systolic CHF
Unlabeled uses: Proteinuria in nondiabetic nephropathy

CONTRAINDICATIONS: Breastfeeding, children, hypersensitivity to ACE inhibitors, history of ACE-inhibitor–induced angioedema

Black Box Warning: Pregnancy (D)

Precautions: Geriatric patients, impaired hepatic function, hypovolemia, blood dyscrasias, CHF, COPD, asthma, angioedema, hyperkalemia, renal artery stenosis, renal disease

DOSAGE AND ROUTES

CHF
• **Adult: PO** 10 mg/day then up to 40 mg/day increased over several weeks; use lower dose for those diuresed before fosinopril
Hypertension
• **Adult: PO** 10 mg/day initially then 20-40 mg/day divided bid or daily, max 80 mg/day
Available forms: Tabs 10, 20, 40 mg
Administer:
• May be taken without regard to meals

SIDE EFFECTS

CNS: *Headache, dizziness,* fatigue
CV: *Hypotension,* orthostatic hypotension, tachycardia
GI: *Nausea,* constipation, vomiting, diarrhea, hepatotoxicity, cholestatic jaundice, fulminant hepatic necrosis, hepatic failure, death
GU: Increased BUN, creatinine, azotemia, renal artery stenosis
HEMA: Decreased Hct, Hgb; eosinophilia, leukopenia, neutropenia
META: Hyperkalemia
RESP: Cough
SYST: Anaphylaxis, angioedema

PHARMACOKINETICS

Peak 3 hr, serum protein binding 97%, half-life 11.5-14 hr, metabolized by liver (metabolites excreted in urine, feces)

INTERACTIONS

Increase: hypotension—diuretics, other antihypertensives, ganglionic blockers, adrenergic blockers, nitrates, acute alcohol ingestion

Increase: toxicity—vasodilators, hydrALAZINE, prazosin, potassium-sparing diuretics, sympathomimetics, digoxin, lithium, NSAIDs

Decrease: absorption—antacids

Decrease: antihypertensive effect—salicylates

Drug/Herb

Increase: antihypertensive effect—hawthorn

Decrease: antihypertensive effect—ephedra

Drug/Lab Test

Increase: AST, ALT, alk phos, glucose, bilirubin, uric acid

False positive: urine acetone

Positive: ANA titer

NURSING CONSIDERATIONS

Assess:

- **Hypertension:** B/P, orthostatic hypotension, syncope
- Blood studies: neutrophils, decreased platelets; obtain WBC with differential baseline and monthly × 6 mo then q2-3mo × 1 yr; if neutrophils $<1000/mm^3$, discontinue (recommended with collagen–vascular disease)
- Renal studies: protein, BUN, creatinine; increased levels may indicate nephrotic syndrome
- Baselines of renal, hepatic studies before therapy begins
- Potassium levels, although hyperkalemia rarely occurs
- **CHF:** edema in feet, legs daily; weigh daily
- **Allergic reactions:** rash, fever, pruritus, urticaria; product should be discontinued if antihistamines fail to help

Perform/provide:

- Storage in tight container at ≤86° F (30° C)
- Supine position for severe hypotension

Evaluate:

- Therapeutic response: decrease in B/P

Teach patient/family:

- Not to discontinue product abruptly; to take at same time of day
- Not to use OTC products (cough, cold, allergy) unless directed by prescriber; not to use salt substitutes containing potassium without consulting prescriber
- About the importance of complying with dosage schedule, even if feeling better
- To rise slowly to sitting or standing position to minimize orthostatic hypotension
- To notify prescriber of mouth sores, sore throat, fever, swelling of hands or feet, irregular heartbeat, chest pain, nonproductive cough
- To report excessive perspiration, dehydration, vomiting, diarrhea; may lead to fall in B/P
- That product may cause dizziness, fainting, lightheadedness during first few days of therapy
- That product may cause skin rash or impaired perspiration
- How to take B/P; normal readings for age group

Black Box Warning: To notify prescriber if pregnancy is planned or suspected, pregnancy (D)

TREATMENT OF OVERDOSE:

0.9% NaCl IV inf, hemodialysis

fosphenytoin (Rx)

(foss-fen'i-toy-in)

Func. class.: Anticonvulsant

Chem. class.: Hydantoin, phosphate phenytoin ester

ACTION: Inhibits spread of seizure activity in motor cortex by altering ion

transport; increases AV conduction, prodrug of phenytoin

USES: Generalized tonic-clonic seizures, status epilepticus, partial seizures

CONTRAINDICATIONS: Pregnancy (D), hypersensitivity, psychiatric conditions, bradycardia, SA and AV block, Stokes-Adams syndrome, absence seizures

Precautions: Breastfeeding, allergies, renal/hepatic disease, myocardial insufficiency, hypoalbuminemia, hypothyroidism, Asian patients positive for HLA-B 1502

Black Box Warning: Rapid IV inf

DOSAGE AND ROUTES

All doses in PE (phenytoin sodium equivalent)

Status epilepticus

- **Adult and adolescent: IV** 15-20 mg PE/kg
- **Child <12 yr (unlabeled): IV** 15-20 mg PE/kg

Nonemergency/maintenance dosing

- **Adult and adolescent >16 yr: IM/IV** 10-20 mg PE/kg; 4-6 mg PE/kg/day (maintenance); start maintenance 12 hr after loading dose; give in 2-3 divided doses

Available forms: Inj 150 mg (100 mg phenytoin equiv), 750 mg (500 mg phenytoin equiv), 50-mg/ml vials

Administer:

Injectable routes

- Give IM/IV; the dosage, concentration, and infusion rate of fosphenytoin should always be expressed, prescribed, and dispensed in phenytoin sodium equivalents (PE); exercise extreme caution when preparing and administering fosphenytoin; the concentration and dosage should be carefully confirmed; fatal overdoses have occurred in children when the per ml concentration of the product (50 mg PE/mL) was misinterpreted as the total amount of drug in the vial
- Visually inspect for particulate matter and discoloration before use

IV INF route

- Before infusion, dilute in 5% dextrose or 0.9% saline solution to a concentration ranging from 1.5 to 25 mg PE/ml
- Because of the risk of hypotension, do not exceed recommended infusion rates. Continuous monitoring of ECG, B/P, and respiratory function is recommended, especially throughout the period where phenytoin concentrations peak (about 10–20 min after the end of the infusion)
- Loading doses should always be followed by maintenance doses of oral or parenteral phenytoin or parenteral fosphenytoin
- **Adult: IV** Infuse at a max rate of 150 mg PE/min
- **Elderly or debilitated adults: IV** Infuse at a max 3 mg PE/kg/min or 150 mg PE/min, whichever is less
- **Child: IV** Infuse at a rate of 0.5–3 mg PE/kg/min or max 150 mg PE/min, whichever is less
- **Infant/neonate: IV** Infuse at a rate max 0.5–3 mg PE/kg/min

Y-site compatibilities: Aminocaproic acid, amphotericin B lipid complex, amphotericin B liposome, anidulafungin, atenolol, bivalirudin, bleomycin, CARBOplatin, CISplatin, cyclophosphamide, cytarabine, DACTINomycin, DAPTOmycin, dexmedetomidine, diltiazem, DOCEtaxel, doxacurium, eptifibatide, ertapenem, etoposide, fludarabine, fluorouracil, gatifloxacin, gemcitabine, gemtuzumab, granisetron, ifosfamide, levofloxacin, linezolid, LORazepam, mechlorethamine, meperidine, methotrexate, metroNIDAZOLE, nesiritide, octreotide, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pamidronate, pantoprazole, PEMEtrexed, PHENobarbital, piperacillin-tazobactam, rocuronium, sodium acetate, tacrolimus, teniposide, thiotepa, tigecycline, tirofiban, vinCRIStine, vinorelbine, voriconazole, zoledronic acid

F

SIDE EFFECTS

CNS: *Drowsiness,* dizziness, insomnia, paresthesias, depression, suicidal tendencies, aggression, headache, confusion, paresthesia
CV: Hypo/hypertension, ventricular fibrillation, CHF, shock
EENT: Nystagmus, diplopia, blurred vision
GI: Nausea, vomiting, diarrhea, constipation, anorexia, weight loss, hepatitis, jaundice, gingival hyperplasia
HEMA: Agranulocytosis, leukopenia, aplastic anemia, thrombocytopenia, megaloblastic anemia
INTEG: Rash, lupus erythematosus, Stevens-Johnson syndrome, hirsutism, hypersensitivity, pruritus
SYST: Hyperglycemia, hypokalemia, SJS/TEN Asian patients positive for HLA-B 1502; drug reaction with eosinophilia and systemic symptoms (DRESS), purple glove syndrome, anaphylaxis

PHARMACOKINETICS

Metabolized by liver, excreted by kidneys, protein binding 95%-99%, rapidly converted to phenytoin

INTERACTIONS

Increase: fosphenytoin level—cimetidine, amiodarone, chloramphenicol, estrogens, H_2 antagonists, phenothiazines, salicylates, sulfonamides, tricyclics, CYP1A2 inhibitors
Decrease: fosphenytoin effects—alcohol (chronic use), antihistamines, antacids, traMADol, antineoplastics, rifampin, folic acid, carBAMazepine, theophylline, CYP1A2 inducers
Decrease: virologic response, resistance—delavirdine, do not use concurrently

Drug/Herb

Increase: anticonvulsant effect—ginkgo
Decrease: anticonvulsant effect—ginseng, valerian

Drug/Lab Test

Increase: glucose, alk phos
Decrease: dexamethasone, metyrapone test serum, PBI, urinary steroids

NURSING CONSIDERATIONS

Assess:

- Drug level: target level 10-20 mcg/ml, toxic level 30-50 mcg/ml, wait >2 hr after dose before testing, 4 hr after IM dose
- Blood studies: CBC, platelets q2wk until stabilized, then monthly × 12 mo, then q3mo; discontinue product if neutrophils $<1600/mm^3$; serum calcium, albumin, phosphorus
- ⚠ Mental status: mood, sensorium, affect, memory (long, short), suicidal thoughts/behaviors
- **Serious skin reactions:** usually occurring within 28 days of treatment; if a rash develops, patient should be evaluated for DRESS
- Seizure activity including type, location, duration, character; provide seizure precaution
- Renal studies: urinalysis, BUN, urine creatinine
- Hepatic studies: ALT, AST, bilirubin, creatinine
- Allergic reaction: red, raised rash; product should be discontinued
- **Toxicity/bone marrow depression:** nausea, vomiting, ataxia, diplopia, cardiovascular collapse, slurred speech, confusion
- Respiratory depression: rate, depth, character of respirations
- ⚠ **Blood dyscrasias:** fever, sore throat, bruising, rash, jaundice
- Continuous monitoring of ECG, B/P, respiratory function
- Rash; discontinue as soon as rash develops, serious adverse reactions such as **Stevens-Johnson syndrome** can occur

Evaluate:

- Therapeutic response: decrease in severity of seizures

Teach patient/family:

- About the reason for, expected outcomes of treatment

- Not to use machinery or engage in hazardous activity, since drowsiness, dizziness may occur
- To carry emergency ID denoting product use, name of prescriber
- To notify prescriber of rash, bleeding, bruising, slurred speech, jaundice of skin or eyes, joint pain, nausea, vomiting, severe headaches
- To keep all medical appointments, including those for lab work, physical assessment
- To notify prescriber if pregnancy is planned, suspected
- To use contraception while using this product

⚠ HIGH ALERT

fospropofol (Rx)

(fos-proe'poe-fol)

Lusedra

Func. class.: General anesthetic

ACTION: Produces dose-dependent CNS depression by activation of GABA receptor

USES: Induction or maintenance of anesthesia as part of balanced anesthetic technique; sedation in mechanically ventilated patients

CONTRAINDICATIONS: Hypersensitivity to product

Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, respiratory depression, severe respiratory disorders, cardiac dysrhythmias, labor/delivery, renal disease, hyperlipidemia

DOSAGE AND ROUTES

Induction/Maintenance

- **Adult <65 (healthy), >90 kg:** 577.5 **IV BOL**, may give supplemental doses up to max of 140 mg, give no more frequently than q4min; 61-89 kg 6.5 mg/kg (max 577.5 mg) **IV BOL** may give supplemental doses up to 1.6 mg/kg/dose (max 140 mg/dose; give no more frequently than q4min); <60 kg 385 mg **IV BOL**, may give supplemental doses up to max 105 mg/dose, give no more frequently than q4min
- **Adult: <65 yr (severe systemic disease), ≥90 kg** 437.5 mg **IV BOL**, give supplemental doses up to max 105 mg/dose, give no more frequently than q4min; 61-89 kg 4.875 mg/kg (max 437.5 mg) give supplemental doses of 75% of standard dose/up to 1.2 mg/kg/dose (max 105 mg/dose) give no more frequently than q4min; <60 kg 297.5 **IV BOL**, give supplemental doses up to max 70 mg/dose, give no more frequently than q4min
- **Geriatric ≥90 kg: IV BOL** 437.5 then supplemental doses up to max 105 mg; give no more frequently than q4min; 61-89 kg, **IV BOL** give 75% standard dosing regimen (4.875 mg/kg), give no more frequently than q4min (max 105 mg/dose)

Available forms: Inj 1050 mg/30 ml

Administer:

IV Bolus route

- Visually inspect for particulate matter and discoloration
- Each vial is single patient/single use
- Draw from vial, discard unused portion
- Do not mix with other drugs prior to use
- Give by IV BOL in free-flowing peripheral IV line of D_5W, 5% dextrose/0.2% NaCl, 5% dextrose/0.45% NaCl D_5LR, LR, 0.45% NaCl, NS, 5% dextrose/0.45% NaCl/20 mEq KCl; do not mix with other fluids, flush line with NS before and after administration
- No filtration needed
- Give only with resuscitative equipment available
- Only qualified persons trained in anesthesia should administer

F

SIDE EFFECTS

CNS: Involuntary movement, headache, jerking, fever, dizziness, shivering, tremor, confusion, somnolence, paresthesia, agitation, abnormal dreams, euphoria, fatigue, increased intracranial pressure, impaired cerebral flow, seizures
CV: *Bradycardia, hypotension,* hypertension, PVC, PAC, tachycardia, abnormal ECG, ST segment depression, asystole, bradydysrhythmias
EENT: Blurred vision, tinnitus, eye pain, strange taste, diplopia
GI: *Nausea, vomiting, abdominal cramping,* dry mouth, swallowing, hypersalivation, pancreatitis
GU: Urine retention, green urine, cloudy urine, oliguria
INTEG: *Flushing, phlebitis, hives, burning/stinging at inj site,* rash, pain of extremities
MS: Myalgia
RESP: Apnea, *cough, hiccups,* dyspnea, hypoventilation, sneezing, wheezing, tachypnea, hypoxia, respiratory acidosis

PHARMACOKINETICS

Onset 15-30 sec, rapid distribution, half-life 1-8 min, terminal half-life .81-.88 hr; 70% excreted in urine; metabolized in liver by conjugation to inactive metabolites, 95%-99% protein binding

INTERACTIONS

⚠ Do not use within 10 days of MAOIs
Increase: CNS depression—alcohol, opioids, sedative/hypnotics, antipsychotics, skeletal muscle relaxants, inhalational anesthetics
Drug/Herb
Increase: fospropofol effect—St. John's wort
Drug/Lab Test
Increase: LFTs, bilirubin

NURSING CONSIDERATIONS

Assess:
- Inj site: phlebitis, burning, stinging
- **ECG** for changes: PVC, PAC, ST segment changes; monitor VS
- CNS changes: movement, jerking, tremors, dizziness, LOC, pupil reaction
- Allergic reactions: hives
- **Respiratory depression,** character, rate, rhythm; notify prescriber if respirations are <10/min; hypoxemia detectable by pulse oximetry

Perform/provide:
- Storage of unopened vials at room temp

Evaluate:
- Therapeutic response: induction of anesthesia

Teach patient/family:
- That this medication will cause dizziness, drowsiness, sedation

TREATMENT OF OVERDOSE:

Discontinue product; administer vasopressor agents or anticholinergics, artificial ventilation

frovatriptan (Rx)

(froh-vah-trip'tan)
Frova
Func. class.: Antimigraine agent
Chem. class.: 5-HT_1-Receptor agonist

ACTION: Binds selectively to the vascular 5-HT_{1B}, 5-HT_{1D} receptor subtypes; exerts antimigraine effect; binds to benzodiazepine receptor sites, causes vasoconstriction in cranium

USES: Acute treatment of migraine with/without aura

CONTRAINDICATIONS: Hypersensitivity, angina pectoris, history of MI, documented silent ischemia, Prinzmetal's angina, ischemic heart disease; concurrent ergotamine-containing preparations; uncontrolled hypertension; basilar or hemiplegic migraine; ischemic bowel disease; peripheral vascular disease, severe hepatic disease, prophylactic migraine treatment
Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, post-

menopausal women, men >40 yr, risk factors for CAD, hypercholesterolemia, obesity, diabetes, impaired hepatic function, seizure disorder

DOSAGE AND ROUTES

• **Adult: PO** 2.5 mg; a 2nd dose may be taken after ≥2 hr; max 3 tabs (7.5 mg/day)
Available form: Tabs 2.5 mg
Administer:
• Swallow tabs whole; do not break, crush, or chew
• With fluids
• 2 days/wk or less; rebound headache may occur

SIDE EFFECTS

CNS: *Hot/cold sensation*, paresthesia, *dizziness*, headache, fatigue, insomnia, anxiety, somnolence, seizures
CV: *Flushing*, chest pain, palpitation
GI: Dry mouth, dyspepsia, abdominal pain, diarrhea, vomiting, nausea
MS: Skeletal pain

PHARMACOKINETICS

Onset of pain relief 2-3 hr, terminal half-life 25-29 hr, protein binding 15%, metabolized liver by CYP1A2

INTERACTIONS

Increase: frovatriptan levels—CYP1A2 inhibitors (cimetidine, ciprofloxacin, erythromycin), estrogen, propranolol, oral contraceptives
Increase: toxicity—SSRIs, other serotonin agonists (dextromethorphan, tramadol, antidepressants)

NURSING CONSIDERATIONS

Assess:
• **Migraine symptoms:** aura, unable to view light; ingestion of tyramine-containing foods (pickled products, beer, wine, aged cheese), food additives, preservatives, colorings, artificial sweeteners, chocolate, caffeine, which may precipitate these types of headaches
• B/P; signs, symptoms of coronary vasospasms
• For stress level, activity, recreation, coping mechanisms
Perform/provide:
• Quiet, calm environment with decreased stimulation from noise, bright light, excessive talking
Evaluate:
• Therapeutic response: decrease in frequency, severity of migraine
Teach patient/family:
• To report any side effects to prescriber
• To use contraception while taking product; to inform prescriber if pregnant or planning to become pregnant
• To consult prescriber if breastfeeding

F

fulvestrant (Rx)

(full-vess'trant)
Faslodex
Func. class.: Antineoplastic
Chem. class.: Estrogen-receptor antagonist

ACTION: Inhibits cell division by competitive binding to cytoplasmic estrogen receptors, downregulates estrogen receptors

USES: Advanced breast carcinoma in estrogen-receptor–positive patients (usually postmenopausal)
Unlabeled uses: Loading dose for metastatic breast cancer

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, children, hypersensitivity
Precautions: Hepatic disease, jaundice, thrombocytopenia, biliary tract disease, coagulopathy

DOSAGE AND ROUTES

• **Adult: IM** 500 mg as 2, 5-ml injections on days 1, 15, 29 and monthly thereafter
Available forms: Inj 50 mg/ml

Administer:
IM route
• IM 5 ml give one inj in each buttock slowly
• Antiemetic 30-60 min before product to prevent vomiting prn

SIDE EFFECTS

CNS: *Headache,* depression, dizziness, insomnia, paresthesia, anxiety
GI: *Nausea, vomiting,* anorexia, constipation, diarrhea, abdominal pain, hepatitis, hepatic failure, hyperbilirubinemia
HEMA: Anemia
INTEG: *Rash,* sweating, *hot flashes,* inj site pain
MS: Bone pain, arthritis, back pain
RESP: Pharyngitis, dyspnea, cough
SYST: Angioedema

PHARMACOKINETICS

Half-life 40 days, metabolized by CYP3A4, excretion in feces 90%

INTERACTIONS

Increase: Bleeding—anticoagulants, do not use concurrently
Drug/Lab Test
Increase: LFTs

NURSING CONSIDERATIONS

Assess:
• For anticoagulant use
• For side effects; report to prescriber
Perform/provide:
• Liquid diet, if needed, including cola, gelatin; dry toast or crackers may be added if patient is not nauseated or vomiting
• Store in refrigerator, protect from light
Evaluate:
• Therapeutic response: decreased tumor size, spread of malignancy
Teach patient/family:
• To report any complaints, side effects to prescriber
• To report vaginal bleeding immediately
• That tumor flare (increase in size of tumor, increased bone pain) may occur, will subside rapidly; that analgesics may be taken for pain
• That premenopausal women must use mechanical birth control because ovulation may be induced; not to breastfeed
• To use contraception to prevent pregnancy; pregnancy category (D)

furosemide (Rx)

(fur-oh'se-mide)
Lasix
Func. class.: Loop diuretic
Chem. class.: Sulfonamide derivative

Do not confuse:
furosemide/torsemide
Lasix/Luvox/Lomotil/Lanoxin

ACTION: Inhibits reabsorption of sodium and chloride at proximal and distal tubule and in the loop of Henle

USES: Pulmonary edema; edema with CHF, hepatic disease, nephrotic syndrome, ascites, hypertension
Unlabeled uses: Hypercalcemia with malignancy, hypertensive emergency/urgency, pulmonary edema or prevention of hemodynamic effects associated with blood product transfusion, ascites

CONTRAINDICATIONS: Breastfeeding, infants, anuria, hypovolemia, electrolyte depletion
Precautions: Pregnancy (C), diabetes mellitus, dehydration, severe renal disease, cirrhosis, ascites, hypersensitivity to sulfonamides/thiazides

DOSAGE AND ROUTES

Edema
• **Adult: PO** 20-80 mg/day in AM; may give another dose after 6 hr up to 600 mg/day; **IM/IV** 20-40 mg; increase by 20 mg q2hr until desired response
• **Child: PO/IM/IV** 2 mg/kg; may increase by 1-2 mg/kg q6-8hr up to 6 mg/kg

Acute pulmonary edema

- **Adult: IV** 40 mg given over several min, repeated after 1 hr; increase to 80 mg if needed
- **Child: IV/IM** 1-2 mg/kg q6-12hr, max 6 mg/kg/dose
- **Premature neonate >32 wk postconceptional age: IV/IM** 1-2 mg/kg q12-24hr
- **Premature neonate ≤32 wk postconceptional age: IV/IM** max 1 mg/kg initially

Antihypercalcemia

- **Adult: IM/IV** 80-100 mg q1-4hr or **PO** 120 mg/day or divided bid
- **Child: IM/IV** 25-50 mg, repeat q4hr if needed

Acute/chronic renal failure

- **Adult: PO** 80 mg/day, increase by 80-120 mg/day to desired response; **IV** 100-200 mg, max 600-800 mg

Hypertensive emergency/urgency (unlabeled)

- **Adult: IV** 40-80 mg

Pulmonary edema/prevention of adverse hemodynamic effects associated with blood product transfusion (unlabeled)

- **Adult: IV** 40 mg injected slowly then 80 mg injected slowly after 2 hr if needed
- **Child: IM/IV** 1-2 mg/kg q6-12hr
- **Premature neonate >32 wk postconceptional age: IM/IV** 1-2 mg/kg q12-24hr
- **Premature neonate ≤32 wk postconceptional age: IM/IV** Max 1 mg/kg, give no more frequently than q24hr

Available forms: Tabs 20, 40, 80 mg; oral sol 8 mg/ml, 10 mg/ml; inj 10 mg/ml

Administer:

- In AM to avoid interference with sleep if using product as diuretic
- Potassium replacement if potassium <3 mg/dl

PO route

- PO with food if nausea occurs; absorption may be decreased slightly; tabs may be crushed

IV route

- Undiluted; may be given through Y-tube or 3-way stopcock; give ≤20 mg/min

Intermittent IV infusion route

- May be added to NS or D_5W; if large doses required and given as IV inf, max 4 mg/min; use inf pump

Y-site compatibilities: Acyclovir, alfentanil, allopurinol, alprostadil, amifostine, amikacin, aminocaproic acid, aminophylline, amphotericin B cholesteryl/lipid complex/liposome, anidulafungin, argatroban, ascorbic acid, atenolol, atropine, azaTHIOprine, aztreonam, bivalirudin, bleomycin, bumetanide, calcium chloride/gluconate, CARBOplatin, cefamandole, ceFAZolin, cefepime, cefmetazole, cefonicid, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, cefTAZidime, ceftizoxime, ceftobiprole, cefTRIAXone, cefuroxime, cephalothin, cephapirin, chloramphenicol, CISplatin, cladribine, clindamycin, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, dexmedetomidine, digoxin, DOCEtaxel, doripenem, doxacurium, DOXOrubicin liposome, enalaprilat, ePHEDrine, EPINEPHrine, etoposide, fentaNYL, fludarabine, fluorouracil, folic acid, foscarnet, gallium nitrate, ganciclovir, granisetron, heparin, hydrocortisone, HYDROmorphone, ifosfamide, imipenem-cilastatin, indomethacin, insulin (regular), isosorbide, kanamycin, leucovorin, lidocaine, linezolid, LORazepam, LR, mannitol, mechlorethamine, melphalan, meropenem, methicillin, methotrexate, methylPREDNISolone, metoprolol, metroNIDAZOLE, mezlocillin, micafungin, miconazole, mitoMYcin, moxalactam, multiple vitamin injection, nafcillin, naloxone, nitroprusside, octreotide, oxacillin, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pamidronate, pantoprazole, PEMEtrexed, penicillin G, PENTobarbital, PHENobarbital, phytonadione, piperacillin, piperacillin-tazobactam, potassium chloride, procainamide,

F

propofol, propranolol, ranitidine, remifentanil, Ringer's, ritodrine, sargramostim, sodium acetate/bicarbonate, succinylcholine, SUFentanil, temocillin, teniposide, theophylline, thiopental, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, TNA, tobramycin, urokinase, vit B/C, voriconazole, zoledronic acid

SIDE EFFECTS

CNS: Headache, fatigue, weakness, vertigo, paresthesias
CV: Orthostatic hypotension, chest pain, ECG changes, circulatory collapse
EENT: Loss of hearing, ear pain, tinnitus, blurred vision
ELECT: *Hypokalemia, hypochloremic alkalosis, hypomagnesemia, hyperuricemia, hypocalcemia, hyponatremia,* metabolic alkalosis
ENDO: *Hyperglycemia*
GI: *Nausea,* diarrhea, dry mouth, vomiting, anorexia, cramps, oral, gastric irritations, pancreatitis
GU: *Polyuria,* renal failure, glycosuria
HEMA: Thrombocytopenia, agranulocytosis, leukopenia, neutropenia, anemia
INTEG: *Rash, pruritus,* purpura, Stevens-Johnson syndrome, sweating, photosensitivity, urticaria
MS: Cramps, stiffness

PHARMACOKINETICS

PO: Onset 1 hr, peak 1-2 hr, duration 6-8 hr, absorbed 70%
IV: Onset 5 min; peak ½ hr; duration 2 hr (metabolized by the liver 30%); excreted in urine, some as unchanged product, and feces; crosses placenta; excreted in breast milk; half-life ½-1 hr

INTERACTIONS

Increase: toxicity—lithium, nondepolarizing skeletal muscle relaxants, digoxin
Increase: hypotensive action of antihypertensives, nitrates
Increase: ototoxicity—aminoglycosides, CISplatin, vancomycin
Increase: effects of anticoagulants, salicylates
Decrease: furosemide effect—probenecid
Drug/Lab Test
Interference: GTT
Increase: LDL

NURSING CONSIDERATIONS

Assess:
• **CHF:** weight, I&O daily to determine fluid loss; effect of product may be decreased if used daily
• **Hypertension:** B/P lying, standing; postural hypotension may occur
• Metabolic alkalosis: drowsiness, restlessness
• **Hypokalemia:** postural hypotension, malaise, fatigue, tachycardia, leg cramps, weakness
• Rashes, temp elevation daily
• Confusion, especially in geriatric patients; take safety precautions if needed
• **Hearing,** including tinnitus and hearing loss, when giving high doses for extended periods
• Rate, depth, rhythm of respiration, effect of exertion, lung sounds
• Electrolytes (potassium, sodium, chloride); include BUN, blood glucose, CBC, serum creatinine, blood pH, ABGs, uric acid
• Glucose in urine if patient diabetic
• Allergies to sulfonamides, thiazides
Perform/provide:
• Increased fluid intake 2-3 L/day unless contraindicated
Evaluate:
• Therapeutic response: improvement in edema of feet, legs, sacral area (CHF); increase urine output, decreased B/P; decreased calcium levels (hypercalcemia)
Teach patient/family:
• To discuss the need for a high-potassium diet or potassium replacement with prescriber
• To rise slowly from lying or sitting position because orthostatic hypotension may occur

- To recognize adverse reactions that may occur: muscle cramps, weakness, nausea, dizziness
- About the entire treatment regimen, including exercise, diet, stress relief for hypertension
- To take with food or milk for GI symptoms
- To use sunscreen or protective clothing to prevent photosensitivity
- To take early in the day to prevent sleeplessness
- To avoid OTC medications unless directed by prescriber

TREATMENT OF OVERDOSE:

Lavage if taken orally; monitor electrolytes; administer dextrose in saline; monitor hydration, CV, renal status

gabapentin (Rx)

(gab'a-pen-tin)

Gralise, Horizant, Neurontin

Func. class.: Anticonvulsant

Do not confuse:
Neurontin/Noroxin/Neoral

ACTION:

Mechanism unknown; may increase seizure threshold; structurally similar to GABA; gabapentin binding sites in neocortex, hippocampus

USES:

Adjunct treatment of partial seizures, with/without generalization in patients >12 yr; adjunct for partial seizures in children 3-12 yr, postherpetic neuralgia, primary restless leg syndrome in adults

Unlabeled uses: Tremors with multiple sclerosis (MS), neuropathic pain, bipolar disorder, migraine prophylaxis, diabetic neuropathy, nystagmus, pruritus, spasticity, menopause, hot flashes, ALS, MS

CONTRAINDICATIONS:

Hypersensitivity to this product

Precautions: Pregnancy (C), breastfeeding, children <3 yr, geriatric patients, renal disease, hemodialysis, suicidal thoughts, depression

DOSAGE AND ROUTES

- **Adult and child >12 yr: PO** 900-1800 mg/day in 3 divided doses; may titrate by giving 300 mg on 1st day, 300 mg bid on 2nd day, 300 mg tid on 3rd day; may increase to 1800-2400 mg/day by adding 300 mg on subsequent days
- **Child 3-12 yr: PO** 10-15 mg/kg/day in 3 divided doses, initially titrate dose upward over approximately 3 days; 25-35 mg/kg/day; all given in 3 divided doses

Postherpetic neuralgia

- **Adult: PO** 300 mg on day 1, 600 mg/day divided bid on day 2, 900 mg/day divided tid, may titrate to 1800-3600 mg divided tid if needed; **EXT REL** (Gralise only) 300 mg on day 1, 600 mg on day 2, 900 mg on days 3-6, 1200 mg on days 7-10, 1500 mg on days 11-14, 1800 mg on day 15 and thereafter

Moderate to severe restless leg syndrome (RLS) (Horizant only)

- **Adult: PO EXT REL** 600 mg daily with food at about 5 PM; if dose missed, take next day at 5 PM

Renal dose

- **Adult and child >12 yr:** CCr 30-59 ml/min, 200-700 mg bid, CCr 15-29 ml/min, 200-700 mg/day, CCr <15 ml/min, 100-300 mg/day

Uremic pruritus in hemodialysis (unlabeled)

- **Adult: PO** 300 mg 3×/wk

Brachioradical pruritus (unlabeled)

- **Adult: PO** 300-1800 mg/day

ALS (unlabeled)

- **Adult: PO** 1000 mg/day in divided doses × 6 mo

Pendular/congenital nystagmus (unlabeled)

- **Adult: PO** 900 mg/day in divided doses initially, up to 2400 mg/day in divided doses

Spasticity in MS (unlabeled)

- **Adult: PO** 600-1200 mg/day in divided doses

Available forms: Caps 100, 300, 400 mg; tabs 600, 800 mg; Horizant: ext rel tab 600 mg; oral sol 250 mg/5 ml; ext rel tab (Gralise): 300, 600 mg

Administer:

- Do not crush or chew caps, ext rel tabs; caps may be opened and contents put in applesauce or dissolved in juice; scored tabs may be cut in half
- 2 hr apart when giving antacids
- Give without regard to meals
- Gradually withdraw over 7 days; abrupt withdrawal may precipitate seizures
- Beginning dose at bedtime to minimize daytime drowsiness
- **Oral sol:** Measure with calibrated device
- **Ext rel:** Give with food at about 5 PM, bioavailability increased with food; swallow whole; do not interchange Gralise with Horizant

SIDE EFFECTS

CNS: *Drowsiness, confusion,* dizziness, fatigue, anxiety, somnolence, ataxia, amnesia, abnormal thinking, unsteady gait, *depression;* children 3-12 yr old, emotional lability, aggression, thought disorder, hyperkinesia, hostility, seizures, suicidal ideation

CV: Vasodilation, peripheral edema, hypotension

EENT: Dry mouth, blurred vision, *diplopia,* nystagmus

GI: Constipation, increased appetite, dental abnormalities, nausea, vomiting

GU: Impotence, bleeding, *UTI*

HEMA: Leukopenia, decreased WBC

INTEG: Pruritus, abrasion, Stevens-Johnson syndrome

MS: Myalgia

RESP: *Rhinitis,* pharyngitis, cough

SYST: Drug reaction with eosinophilia and systemic symptoms (DRESS)

PHARMACOKINETICS

Protein binding <3% not metabolized; excreted in urine (unchanged); elimination half-life 5-7 hr, prolonged to 130 hr in ESRD

INTERACTIONS

Increase: CNS depression—alcohol, sedatives, antihistamines, all other CNS depressants

Increase: gabapentin levels—morphine

Decrease: gabapentin levels—antacids, sevelamar, cimetidine

Decrease: effect of—HYDROcodone

Drug/Lab Test

False positive: urinary protein using Ames N-multistix SG

NURSING CONSIDERATIONS

Assess:

- **Seizures:** aura, location, duration, activity at onset
- **Pain:** location, duration, characteristics if using for chronic pain, migraine
- ⚠ Mental status: mood, sensorium, affect, behavioral changes, **suicidal thoughts/behaviors;** if mental status changes, notify prescriber
- Eye problems, need for ophthalmic exam before, during, after treatment (slit lamp, funduscopy, tonometry)
- WBC, gabapentin level (therapeutic 5.9-21 mcg/ml, toxic >85 mcg/ml)
- Drug reaction with eosinophilia and systemic symptoms

Perform/provide:

- Storage at room temp away from heat and light
- **Seizure precautions:** padded side rails; move objects that may harm patient
- Increased fluids, bulk in diet for constipation

Evaluate:

- Therapeutic response: decreased seizure activity; decrease in chronic pain

Teach patient/family:

- To carry emergency ID stating patient's name, products taken, condition, prescriber's name and phone number
- To avoid driving, other activities that require alertness because dizziness, drowsiness may occur
- Not to discontinue medication quickly after long-term use; to taper over ≥1 wk because withdrawal-precipitated seizures may occur; not to double doses if

dose is missed; to take if 2 hr or more before next dose
• To notify prescriber if pregnancy planned or suspected; to avoid breastfeeding
• Not to use within 2 hr of antacid, may take regular release without regard to meals; ext rel should be taken with food; to take as directed, doses interval should not be ≥12 hr

galantamine (Rx)

(gah-lan'tah-meen)

Razadyne, Razadyne ER, Reminyl ✤

Func. class.: Anti-Alzheimer agent
Chem. class.: Centrally acting cholinesterase inhibitor

ACTION: Enhances cholinergic functioning by increasing acetylcholine in cerebral cortex

USES: Mild to moderate dementia of Alzheimer's disease
Unlabeled uses: Vascular dementia, dementia with Lewy bodies, Pick's disease

CONTRAINDICATIONS: Hypersensitivity to this product, GI bleeding, jaundice, renal failure, breastfeeding, children
Precautions: Pregnancy (B), geriatric patients, respiratory/renal/hepatic/cardiac disease, seizure disorder, peptic ulcer, asthma, bradycardia, heart block, surgery, urinary tract obstruction

DOSAGE AND ROUTES

• **Adult: PO** 4 mg bid with morning and evening meals; after 4 wk or more, may increase to 8 mg bid; may increase to 12 mg bid after another 4 wk, usual dose 16-24 mg/day in 2 divided doses; **EXT REL** 8 mg/day in AM; may increase to 16 mg/day after 4 wk and 24 mg/day after another 4 wk
Hepatic dose
• **Adult: PO** Child-Pugh 7-9, max 16 mg/day; Child-Pugh 10-15, avoid use
Renal dose
• **Adult: PO** CCr 10-70 ml/min, max 16 mg/day; CCr <9 ml/min, avoid use
Available forms: Tabs 4, 8, 12 mg; ext rel tabs 8, 16, 24 mg; oral sol 4 mg/ml
Administer:
PO route
• With meals; take with morning and evening meal (immediate rel); morning (ext rel)
• Dose increase after minimum of 4 wk at prior dose; if dose is interrupted for ≥3 days, restart at lower dose, titrate to current dose
• Ext rel in AM with food; do not crush, open, or chew
• **Oral sol:** use pipette provided, put in liquid and have patient consume

SIDE EFFECTS

CNS: *Tremors, insomnia,* depression, dizziness, headache, somnolence, fatigue
CV: Bradycardia, chest pain, AV block
GI: *Nausea, vomiting, anorexia, abdominal distress, flatulence,* diarrhea
GU: Urinary incontinence, bladder outflow obstruction, hematuria
HEMA: Anemia
META: Weight decrease
MS: Asthenia
RESP: Upper respiratory tract infection, rhinitis

PHARMACOKINETICS

Rapidly and completely absorbed; metabolized by CYP2D6, 3A4; excreted via kidneys; clearance is lower in geriatric patients, hepatic disease; clearance is 20% lower in females; elimination half-life 7 hr; 18% protein binding

INTERACTIONS

Increase: Synergistic effect: cholinomimetics, other cholinesterase inhibitors
Increase: galantamine effect—CYP3A4, CYP2D6 inhibitors (antiretroviral protease inhibitors, ketoconazole, erythromy-

cin, conivaptan, delaviridine, diltiazem, efavirenz, fluconazole, fluvoxaMINE, imatinib, itraconazole, clarithromycin, troleandomycin, nefazodone, niCARdipine, verapamil, voriconazole, zafirlukast)
Increase: GI effects—NSAIDs
Decrease: galantamine effect—CYP3A4, CYP2D6 inducers (bosentan, carBAMazepine, nevirapine, OXcarbazepine, phenytoin, fosphenytoin/rifabutin, rifampin, rifapentine, troglitazone)
Drug/Herb
Decrease: galantamine effect—St. John's wort

NURSING CONSIDERATIONS

Assess:
Alzheimer's disease: mental status: affect, mood, behavioral changes, depression, attention, confusion; neurologic status: long- and short-term memory, cognitive functioning
• Hepatic/renal studies: AST, ALT, alk phos, LDH, bilirubin, CBC; BUN, creatinine
• For severe GI effects: nausea, vomiting, anorexia, weight loss
• B/P, heart rate, respiration during initial treatment: bradycardia/AV block may occur
• Fluid status: ensure adequate hydration
Perform/provide:
• Assistance with ambulation during beginning therapy
Evaluate:
• Therapeutic response: decreased confusion
Teach patient/family:
• To notify all prescribers of use
• About correct procedure for giving oral sol using instruction sheet provided
• To notify prescriber of severe GI effects; hypo/hypertension, slow heart rate
• That product is not a cure but relieves symptoms
• That results may take several weeks or months to occur

ganciclovir (Rx)

(gan-sye'kloe-vir)
Cytovene, Vitrasert, Zirgan
Func. class.: Antiviral
Chem. class.: Synthetic nucleoside analog

Do not confuse:
Cytovene/Cytosar

ACTION: Inhibits replication of herpesviruses; competitively inhibits human CMV DNA polymerase and is incorporated, resulting in termination of DNA elongation

USES: Cytomegalovirus (CMV) retinitis in immunocompromised persons, including those with AIDS, after indirect ophthalmoscopy confirms diagnosis; prophylaxis for CMV in transplantation; ophthalmic: acute herpes keratitis
Unlabeled uses: CMV pneumonia in organ transplant patients; CMV gastroenteritis, esophagitis, colitis; CMV pneumonitis, congenital CMV disease; Epstein-Barr virus; herpes simplex types 1, 2; varicella-zoster, hepatitis B

CONTRAINDICATIONS: Hypersensitivity to acyclovir, ganciclovir

Black Box Warning: Absolute neutrophil count <500, platelet count <25,000 (intravitreal)

Precautions: Pregnancy (C), breastfeeding, children <6 mo, geriatric patients, preexisting cytopenias, renal function impairment, radiation therapy, hypersensitivity to famciclovir, penciclovir, valacyclovir, valganciclovir

Black Box Warning: Secondary malignancy, bone marrow suppression, anemia, infertility, neutropenia

DOSAGE AND ROUTES

Prevention of CMV
• **Adult/adolescent (unlabeled):** IV 5 mg/kg/dose over 1 hr q12hr × 1-2 wk,

then 5 mg/kg/day 7 day/wk, then 6 mg/kg/day × 5 days/wk; **PO** 1000 mg tid starting 10 days posttransplant × 14 wk

Induction treatment

• **Adult: IV** 5 mg/kg/dose given over 1 hr, q12hr × 2-3 wk

Maintenance treatment

• **Adult: IV INF** 5 mg/kg given over 1 hr, daily × 7 days/wk or 6 mg/kg/day × 5 days/wk; **PO** 1000 mg tid with food or 500 mg q3hr while awake for 6 doses; **INTRAVITREAL** 4.5 mg implant

Acute herpes keratitis

• **Adult/adolescent/child ≥2 yr: OPHTH** 1 drop in affected eye 5 times daily

Renal dose

• **Adult: IV** CCr 50-69 ml/min, reduce to 2.5 mg/kg q12hr (induction), 2.5 mg/kg q24hr (maintenance); **PO** 1500 mg/day or 500 mg tid; **IV** CCr 25-49 ml/min, reduce to 2.5 mg q24hr (induction); 1.25 mg/kg q24hr (maintenance); **PO** 1000 mg/day or 500 mg bid; **IV** CCr 10-24 ml/min, reduce to 1.25 mg/kg q24hr (induction); 0.625 mg/kg q24hr (maintenance); **PO** 500 mg/day; **IV** CCr <10 ml/min, reduce to 1.25 mg/kg 3×/wk after hemodialysis (induction); 0.625 mg/kg 3×/wk after hemodialysis (maintenance); **PO** 500 mg 3×/wk after hemodialysis

Available forms: Powder for inj 500 mg/vial; caps 250, 500 mg; implant, intravitreal 4.5 mg; ophth gel 0.15% (Zirgan)

Administer:

PO route

• With food and a full glass of water

• Do not open, crush capsules

Intravitreal implant route

• Implanted by surgeon only

• Handle carefully to prevent damage to coating

Intravitreal inj route (unlabeled)

• Reconstitute and dilute IV powder to 2 mg/0.1 ml or 5 mg/0.1 ml, depending on dose; injected using TB syringe

IV route

• Mixed in biologic cabinet using gown, gloves, mask; use cytotoxic handling procedures

Intermittent IV INF route

• IV after reconstituting 500 mg/10 ml sterile water for inj (50 mg/ml); shake; further dilute in 50-250 ml D_5W, 0.9% NaCl, LR, Ringer's and run over 1 hr; use inf pump, in-line filter

• Do not give by bolus IV, IM, SUBCUT inj

• Use reconstituted sol within 24 hr; do not refrigerate or freeze

Y-site compatibilities: Allopurinol, amphotericin B cholesteryl, CISplatin, cyclophosphamide, DOXOrubicin liposome, enalaprilat, etoposide, filgrastim, fluconazole, gatifloxacin, granisetron, linezolid, melphalan, methotrexate, PACLitaxel, propofol, remifentanil, tacrolimus, teniposide, thiotepa

SIDE EFFECTS

CNS: *Fever,* chills, coma, *confusion,* abnormal thoughts, dizziness, bizarre dreams, *headache,* psychosis, tremors, somnolence, *paresthesia, weakness,* seizures, peripheral neuropathy

CV: Dysrhythmia, hypo/hypertension

EENT: Retinal detachment in CMV retinitis, ocular hypertension, ocular pain, conjunctival scarring, cataracts

GI: *Abnormal LFTs, nausea, vomiting, anorexia, diarrhea, abdominal pain,* hemorrhage, perforation, pancreatitis

GU: Hematuria, *increased creatinine,* BUN, infertility, decreased sperm count

HEMA: Granulocytopenia, thrombocytopenia, irreversible neutropenia, anemia, eosinophilia, pancytopenia

INTEG: *Rash,* alopecia, *pruritus,* urticaria, pain at site, phlebitis

RESP: Dyspnea

PHARMACOKINETICS

Half-life 3-4½ hr; excreted by kidneys (unchanged); crosses blood-brain barrier, CSF, increased bioavailability with fatty foods

INTERACTIONS

Increase: severe granulocytopenia—zidovudine, antineoplastics, radiation; do not give together

Increase: ganciclovir toxicity—adriamycin, amphotericin B, cycloSPORINE, dapsone, DOXOrubicin, flucytosine, pentamidine, probenecid, trimethoprim-sulfamethoxazole combinations, vinBLAStine, vinCRIStine, other nucleoside analogs, mycophenolate, tenofovir, tacrolimus, aminoglycosides, NSAIDs

Increase: seizures—imipenem/cilastatin

Increase: didanosine effect—didanosine

Drug/Lab Test

Increase: LFTs, creatinine

Decrease: Hgb, WBC, platelets, neutrophils, granulocytes

NURSING CONSIDERATIONS

Assess:

• **CMV retinitis:** culture should be completed before starting treatment (urine, blood, throat), ophthalmic exam

• **Infection:** increased temp, sore throat, chills, fever; report to prescriber

Black Box Warning: Leukopenia/neutropenia/thrombocytopenia: CBC, WBCs, platelets q2days during 2×/day dosing and then q1wk for leukopenia with daily WBC count in patients with prior leukopenia with other nucleoside analogs or for whom leukopenia counts are <1000 cells/mm^3 at start of treatment

• Serum creatinine or CCr ≥q2wk, BUN; LFTs; ophthalmic exam

• For seizures, dysrhythmias

Evaluate:

Black Box Warning: Secondary malignancy: avoid direct contact with powder in caps/solution, if skin contact occurs, wash thoroughly with soap and water; do not get in the eyes

• Therapeutic response: decreased symptoms or prevention of CMV

Teach patient/family:

• Do not wear contact lenses while using gel

• That product does not cure condition; that regular blood tests, ophthalmologic exams are necessary

• That major toxicities may necessitate discontinuing product

Black Box Warning: To use contraception during treatment and that infertility may occur; to use barrier contraception for 90 days after treatment; may cause reversible infertility at lower doses, irreversible infertility at higher doses

• To take PO with food

⚠ To report infection: fever, chills, sore throat; blood dyscrasias: bruising, bleeding, petechiae; to avoid crowds, persons with respiratory infections

ganciclovir ophthalmic

See Appendix B

gatifloxacin

(ga-ti-floks'a-sin)

Zymar, Zymaxid

Func. class.: Ophthalmic anti-infective

Chem. class.: Fluoroquinolone

Do not confuse: gatifloxacin/levofloxacin/moxifloxacin

ACTION: Inhibits DNA gyrase, thereby decreasing bacterial replication

USES: Bacterial conjunctivitis

CONTRAINDICATIONS: Hypersensitivity to this product or fluoroquinolones, infants <1 yr

Precautions: Pregnancy (C), breastfeeding

DOSAGE AND ROUTES

Bacterial conjunctivitis

• **Adult/adolescent/child ≥1 yr: OPHTH SOL** Instill 1 drop in affected eye(s) every 2 hr while awake × 2 days, then 1 drop up to qid × 5 more days or

Zymaxid 1 drop every 2 hr while awake first day, then bid to qid while awake days 2 to 7

Available forms: Ophthalmic solution 0.3%, 0.5%

Administer:

Ophthalmic route

- Commercially available ophthalmic solutions are not for injection subconjunctivally or into the anterior chamber of the eye
- Apply topically to the eye, taking care to avoid contamination
- Do not touch the tip of the dropper to the eye, fingertips, or other surface
- Apply pressure to lacrimal sac for 1 min after instillation
- Avoid wearing contact lenses during treatment

SIDE EFFECTS

EENT: Hypersensitivity, irritation, redness, tearing, keratitis, blepharitis, taste changes

PHARMACOKINETICS

Unknown

NURSING CONSIDERATIONS

Assess:

- **Allergic reaction**: hypersensitivity, discontinue product

Evaluate:

- Decreased ophthalmic infection

Teach patient/family:

Ophthalmic route

- To apply topically to the eye, taking care to avoid contamination; for ophthalmic use only
- Not to touch the tip of the dropper to the eye, fingertips, or other surface
- To apply pressure to lacrimal sac for 1 min after instillation
- To avoid wearing contact lenses during treatment

gefitinib (Rx)

(ge-fi'tye-nib)

Iressa

Func. class.: Antineoplastic—miscellaneous

Chem. class.: Epidermal growth factor receptor inhibitor

ACTION: Not fully understood; inhibits intracellular phosphorylation of cell surface receptors associated with epidermal growth factor receptors

USES: Advanced/metastatic non–small cell lung cancer (NSCLC) in those who have not responded to platinum or DOCEtaxel products

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, children, hypersensitivity

Precautions: Geriatric patients, ocular/pulmonary/renal/hepatic disorders

DOSAGE AND ROUTES

- **Adult: PO** 250 mg/day

Available forms: Tabs 250 mg

SIDE EFFECTS

EENT: Amblyopia, conjunctivitis, eye pain, corneal erosion/ulcer

GI: *Nausea, diarrhea, vomiting,* anorexia, **pancreatitis,** mouth ulceration, **hepatotoxicity**

INTEG: *Rash,* pruritus, *acne, dry skin,* **toxic epidermal necrolysis, angioedema**

MISC: Peripheral edema, **hemorrhage**

RESP: **Interstitial lung disease,** cough, dyspnea, pneumonia

PHARMACOKINETICS

Slowly absorbed; excreted in feces (86%), urine (<4%); elimination half-life 48 hr; metabolism by CYP3A4

INTERACTIONS

Increase: gefitinib concentrations—ketoconazole, itraconazole, erythromycin, clarithromycin
Increase: bone marrow suppression—cloZAPine
Increase: plasma concentration of warfarin, metoprolol
Decrease: gefitinib levels—phenytoin, rifampin, cimetidine, ranitidine, sodium bicarbonate
Drug/Herb
Decrease: gefitinib levels—St. John's wort

NURSING CONSIDERATIONS

Assess:
⚠ Pulmonary changes: lung sounds, cough, dyspnea; interstitial lung disease may occur, may be fatal; discontinue therapy if confirmed
• Ocular changes: eye irritation, corneal erosion/ulcer, aberrant eyelash growth
⚠ Pancreatitis: abdominal pain, levels of amylase, lipase
⚠ Toxic epidermal necrolysis, angioedema
• GI symptoms: frequency of stools, if diarrhea is poorly tolerated, therapy may be discontinued for up to 14 days; LFTs baseline and periodically
Administer:
• Without regard to food; avoid grapefruit juice
• May be dispersed in half-glass of water (noncarbonated), rinse glass and drink liquid, may be given through NG tube
Evaluate:
• Therapeutic response: decreased NSCLC
Teach patient/family:
⚠ To report adverse reactions immediately: shortness of breath, severe abdominal pain, ocular changes, skin eruptions
• Reason for treatment, expected results
• Use contraception during treatment; avoid breastfeeding
• Avoid persons with infections

gemcitabine (Rx)

(jem-sit'a-been)
Gemzar
Func. class.: Antineoplastic—miscellaneous
Chem. class.: Nucleoside analog

Do not confuse:
Gemzar/Zinecard

ACTION: Exhibits antitumor activity by killing cells undergoing DNA synthesis (S phase) and blocking G1/S-phase boundary

USES: Adenocarcinoma of the pancreas (nonresectable stage II, III, or metastatic stage IV); in combination with CISplatin for inoperable, advanced, or metastatic non–small-cell lung cancer; advanced breast cancer in combination with PACLitaxel; with CARBOplatin for ovarian cancer
Unlabeled uses: Bladder cancer, mesothelioma, adjuvant treatment of pancreatic cancer, ovarian cancer single agent, biliary tract cancer, advanced T-cell lymphoma

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, hypersensitivity
Precautions: Children, geriatric patients, myelosuppression, radiation therapy, renal/hepatic disease, accidental exposure, alcoholism, dental disease, infection

DOSAGE AND ROUTES

Pancreatic carcinoma (nonresectable stage II, III, IV)
• **Adult: IV** 1000 mg/m^2 given over 30 min/wk up to 7 wk then 1 wk rest period; subsequent cycles should be infused 1×/wk × 3 wk out of every 4 wk depending on hematologic toxicity
Non–small-cell lung cancer
• **Adult: IV** (4-wk schedule) 1000 mg/m^2 given over 30 min on days 1, 8, 15, of

each 28-day cycle; give CISplatin **IV** 100 mg/m² on day 1 after gemcitabine; 3-wk schedule: 1250 mg/m² given over 30 min on days 1, 8 of each 21-day cycle; give CISplatin **IV** 100 mg/m² after the inf of gemcitabine on day 1

Advanced breast cancer

• **Adult: IV** 1250 mg/m² over 30 min on days 1 and 8 of 21-day cycle; give with PACLitaxel 175 mg/m² over 3 hr before gemcitabine on day 1

Recurrent ovarian cancer (single agent) (unlabeled)

• **Adult: IV** 1 g/m², days 1, 8, 15 of 28-day cycle

Available forms: Lyophilized powder for inj 20 mg/ml (10-, 50-ml vials)

Administer:

IV route

• Prepare in biologic cabinet using gown, mask, gloves; use cytotoxic handling procedures

• After reconstituting with 0.9% NaCl 5 ml/200-mg vial of product or 25 ml/1-g vial of product (38 mg/ml) shake; may be further diluted with 0.9% NaCl to conc as low as 0.1 mg/ml; discard unused portions, give over 30 min, do not admix

• Diluted solution stable at room temp for 24 hr, do not refrigerate

• Infusions longer than 60 min increase toxicity

• **Bone marrow depression:** CBC, differential, platelet count before each dose; single agent: absolute granulocyte count >1000 and platelets >100,000, give complete dose; absolute granulocyte count 500-999, platelets 50,000-99,999, give 75%; absolute granulocyte count <500 or platelets <50,000, do not give; combination with PACLitaxel for breast cancer: absolute granulocyte count >1200 and platelets >75,000, give complete dose; absolute granulocyte count 1000-1199 or platelets 50,000-75,000, give 75%; absolute granulocyte 700-999 or platelets ≥50,000, give 50%; granulocyte count <700 or platelet <50,000, do not give; combination with CARBOplatin for ovarian cancer: absolute granulocyte count >1500 and platelet count >100,000, give complete dose; absolute granulocyte count 1000-1499 or platelets 75,000-99,000, give 75%; absolute granulocyte count <1000 or platelets <75,000, do not give

Y-site compatibilities: Amifostine, amikacin, aminophylline, ampicillin, aztreonam, bleomycin, bumetanide, butorphanol, calcium gluconate, cefOXitin, cefTAZidime, ceftizoxime, cefTRIAXone, chlorproMAZINE, cimetidine, ciprofloxacin, CISplatin, clindamycin, cyclophosphamide, cytarabine, DACTINomycin, DAUNOrubicin, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, DOXOrubicin, droperidol, enalaprilat, etoposide, famotidine, floxuridine, fluconazole, fludarabine, fluorouracil, gentamicin, granisetron, haloperidol, heparin, hydrocortisone, HYDROmorphone, IDArubicin, ifosfamide, leucovorin, linezolid, LORazepam, mannitol, meperidine, mesna, metoclopramide, metroNIDAZOLE, minocycline, mitoXANtrone, morphine, nalbuphine, ondansetron, PACLitaxel, promethazine, ranitidine, streptozocin, teniposide, thiotepa, ticarcillin, tobramycin, topotecan, trimethoprim/sulfamethoxazole, vancomycin, vinBLAStine, vinCRIStine, vinorelbine, zidovudine, zoledronic acid

SIDE EFFECTS

ENDO: Hyperglycemia

GI: Diarrhea, *nausea, vomiting,* anorexia, constipation, stomatitis

GU: *Proteinuria,* hematuria

HEMA: Leukopenia, anemia, neutropenia, thrombocytopenia

INTEG: Irritation at site, *rash, alopecia*

META: Hypocalcemia, hypokalemia, hypomagnesemia

OTHER: Dyspnea, *fever,* hemorrhage, infection, flulike symptoms, paresthesia, *peripheral edema,* myalgia

PHARMACOKINETICS

Half-life 42-379 min, crosses placenta, excretion: renal, 92%-98%

INTERACTIONS

Increase: bleeding—NSAIDs, alcohol, salicylates, anticoagulants
Increase: myelosuppression, diarrhea—other antineoplastics, radiation
Decrease: antibody response—live virus vaccines
Drug/Lab Test
Increase: BUN, AST, ALT, alk phos, bilirubin, creatinine
Decrease: Hgb, WBC, neutrophils, platelets

NURSING CONSIDERATIONS

Assess:
• **Blood dyscrasias:** bruising, bleeding, petechiae
• I&O, nutritional intake; food preferences: list likes, dislikes
• Renal, hepatic studies before and during treatment; may increase AST, ALT, alk phos, bilirubin, BUN, creatinine, calcium, potassium, glucose, magnesium, urine protein
• Buccal cavity for dryness, sores, ulceration, white patches, oral pain, bleeding, dysphagia
• GI symptoms: frequency of stools, cramping
• Signs of dehydration: rapid respirations, poor skin turgor, decreased urine output, dry skin, restlessness, weakness
Perform/provide:
• Increased fluid intake to 2-3 L/day to prevent dehydration unless contraindicated
• Rinsing of mouth tid-qid with water, club soda; brushing of teeth bid-tid with soft brush or cotton-tipped applicator for stomatitis; use unwaxed dental floss
• Antiemetic agents
Evaluate:
• Therapeutic response: decrease in tumor size; decrease in spread of cancer; symptom relief
Teach patient/family:
• To avoid foods with citric acid or hot or rough texture if stomatitis is present; to drink adequate fluids; to avoid use with NSAIDs, alcohol, salicylates
• To report stomatitis and any bleeding, white spots, ulcerations in mouth; to examine mouth daily, report symptoms
• To report signs of anemia: fatigue, headache, faintness, SOB, irritability; hematuria, dysuria
• To use contraception during therapy and for 4 mo after; pregnancy (D), do not breastfeed
• Not to receive vaccinations during treatment
• About possible hair loss and what can be done
• To report flulike symptoms, swelling of feet/legs
• To report bruising, bleeding: gums, blood in urine, stool, emesis
• To avoid crowds, persons with known upper-respiratory infections
• To avoid use of hard-bristle toothbrush, electric razor
• Infection: to report sore throat, fever, flulike symptoms immediately

gemfibrozil (Rx)

(jem-fi'broe-zil)
Lopid
Func. class.: Antilipemic
Chem. class.: Fibric acid derivative

Do not confuse:
Lopid/Levbid/Slo-bid

ACTION: Inhibits biosynthesis of VLDL, decreases triglycerides, increases HDL

USES: Type IIb, IV, V hyperlipidemia as adjunct with diet therapy, hypertriglyceridemia

CONTRAINDICATIONS: Severe renal/hepatic disease, preexisting gallbladder disease, primary biliary cirrhosis, hypersensitivity
Precautions: Pregnancy (C), breastfeeding; monitor hematologic and hepatic function

DOSAGE AND ROUTES

• **Adult: PO** 600 mg bid 30 min before AM, PM meal

Hepatic/renal dose

• Avoid use

Available forms: Tabs 600 mg; caps 300 mg ✤

Administer:

PO route

• Should not be used with repaglinide or itraconazole

• 30 min before AM, PM meals

• Discontinue product if response does not occur within 3 mo

SIDE EFFECTS

CNS: Fatigue, vertigo, headache, paresthesia, dizziness, somnolence

GI: *Dyspepsia, diarrhea, abdominal pain,* nausea, vomiting

HEMA: Leukopenia, anemia, eosinophilia, thrombocytopenia

INTEG: Rash, urticaria, pruritus

MISC: Taste perversion

MS: Myopathy, rhabdomyolysis

SYST: Angioedema, exfoliative dermatitis

PHARMACOKINETICS

Peak 1-2 hr; plasma protein binding >90%; half-life 1½ hr; 70% excreted in urine mostly unchanged; metabolized in liver (minimal)

INTERACTIONS

Increase: hypoglycemic effect—sulfonylureas, repaglinide

Increase: anticoagulant properties—warfarin

Increase: risk of myositis, myalgia—HMG-CoA reductase inhibitors

Decrease: effect of cycloSPORINE

Decrease: effect of gemfibrozil—bile acid sequestrants, separate by >2 hr

Drug/Lab Test

Increase: LFTs, CK

Decrease: Hgb, Hct, WBC, potassium, eosinophils, platelets

NURSING CONSIDERATIONS

Assess:

• Hyperlipidemia: diet history: fats, triglycerides, cholesterol; if lipids increase, product should be discontinued; LDL, VLDL baseline and periodically

• **Myopathy, rhabdomyolysis:** For muscle pain, tenderness; obtain baseline CPK; if elevated or if these occur, product should be discontinued; at greater risk if combined with HMG-Co-A reductase inhibitors

• Renal, hepatic studies, CBC, blood glucose if patient is receiving long-term therapy; if LFTs increase, therapy should be discontinued

• Bowel pattern daily; watch for increasing diarrhea (common)

Evaluate:

• Therapeutic response: decreased cholesterol, triglyceride levels; HDL, cholesterol ratios improved

Teach patient/family:

• That compliance is needed for positive results; not to double or skip dose

• That risk factors should be decreased: high-fat diet, smoking, alcohol consumption, absence of exercise

• To notify prescriber of diarrhea, nausea, vomiting, chills, fever, sore throat, muscle cramps, abdominal cramps, severe flatulence, tendon pain

• To avoid driving, hazardous activities if dizziness, blurred vision occur

gemifloxacin (Rx)

(gem-ah-flox'a-sin)

Factive

Func. class.: Antiinfective

Chem. class.: Fluoroquinolone

ACTION: Inhibits DNA gyrase, which is an enzyme involved in replication, transcription, and repair of bacterial DNA

USES: Acute bacterial exacerbation of chronic bronchitis caused by *Strepto-*

coccus pneumoniae, Haemophilus influenzae, Haemophilus parainfluenzae, Moraxella catarrhalis; community-acquired pneumonia caused by *Streptococcus pneumoniae* including multiproduct-resistant strains, *H. influenzae, M. catarrhalis, Mycoplasma pneumoniae, Chlamydia pneumoniae, Klebsiella pneumoniae*

Unlabeled uses: *Actinetobacter iwoffii,* cystitis, *Klebsiella oxytoca, Legionella pneumophilia, Proteus vulgaris,* pyelonephritis, sinusitis, *Streptococcus pyogenes* (group A β-hemolytic streptococci), urinary tract infection

CONTRAINDICATIONS:

Hypersensitivity to quinolones

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, hypokalemia, hypomagnesium, renal disease, seizure disorders, excessive exposure to sunlight, psychosis, increased intracranial pressure, history of QT interval prolongation, dysrhythmias, myasthenia gravis, torsades de pointes

Black Box Warning: Tendon pain/rupture, tendinitis, myasthenia gravis

DOSAGE AND ROUTES

• **Adult: PO** 320 mg/day × 5-10 days depending on type of infection

Renal dose

• **Adult: PO** CCr ≤40 ml/min, 160 mg q24hr

Available forms: Tabs 320 mg

Administer:

• 2 hr before or 3 hr after aluminum/magnesium antacids, iron, zinc products, multivitamins, buffered products 2 hr before sucralfate

SIDE EFFECTS

CNS: *Dizziness, headache,* somnolence, depression, insomnia, nervousness, confusion, agitation, seizures, pseudotumor cerebri

CV: QT prolongation, vasodilation

EENT: Visual disturbances

GI: Diarrhea, *nausea,* vomiting, anorexia, flatulence, heartburn, dry mouth; increased AST, ALT; constipation, abdominal pain, oral thrush, glossitis, stomatitis, pseudomembranous colitis

GU: Crystalluria (rare)

HEMA: Thrombocytopenia, neutropenia

INTEG: Rash, pruritus, urticaria, *photosensitivity*

MS: Tendinitis, tendon rupture

SYST: Anaphylaxis, Stevens-Johnson syndrome

PHARMACOKINETICS

Rapidly absorbed; bioavailability 71%; peak 1-2 hr; half-life 4-12 hr; excreted in urine as active product, metabolites

INTERACTIONS

Increase: CNS stimulation—NSAIDs

Increase: toxicity of gemifloxacin—probenecid

Increase: QT prolongation—class IA, III antidysrhythmics, tricyclics, amoxapine, maprotiline, phenothiazines, haloperidol, pimozide, risperiDONE, sertindole, ziprasidone, β-blockers, chloroquine, cloZAPine, dasatinib, dolasetron, droperidol, dronedarone, flecainide, halogenated/local anesthetics, local anesthetics, lapatinib, methadone, erythromycin, telithromycin, troleandomycin, octreotide, ondansetron, palonosetron, pentamidine, propafenone, ranolazine, SUNItinib, tacrolimus, vardenafil, vorinostat

Decrease: absorption antacids containing aluminum, magnesium, sucralfate, zinc, iron, give 2 hr before or 3 hr after meals

NURSING CONSIDERATIONS

Assess:

• Renal, hepatic studies: BUN, creatinine, AST, ALT; I&O ratio

• CNS symptoms: insomnia, vertigo, headache, agitation, confusion

Allergic reactions and anaphylaxis: rash, flushing, urticaria, pruritus, chills, fever, joint pain; may occur a few days after therapy begins; EPINEPHrine and

resuscitation equipment should be available for anaphylactic reaction

• **Pseudomembranous colitis:** bowel pattern daily; if severe diarrhea, fever, abdominal pain occur, product should be discontinued

• **QT prolongation:** avoid use of quinolones in patients with known QT prolongation, females and those with ongoing proarrhythmic conditions (TdP) are at a greater risk; monitor ECG and/or holter monitoring if product is used

• **Overgrowth of infection:** perineal itching, fever, malaise, redness, pain, swelling, drainage, rash, diarrhea, change in cough, sputum

Black Box Warning: **Tendon rupture:** tendon pain, inflammation; if present, discontinue use, more common when used with corticosteroids, discontinue immediately if tendon pain, inflammation occurs

• **Toxic psychosis/pseudotumor cerebri:** headache, blurred vision, neck/shoulder pain, nausea, vomiting, dizziness, tinnitus; discontinue immediately

Evaluate

• Therapeutic response: negative C&S, absence of signs, symptoms of infection

Teach patient/family:

• To take with/without food

• That fluids must be increased to 2 L/day to avoid crystallization in kidneys

• That if dizziness or lightheadedness occurs, to perform activities with assistance

• To complete full course of product therapy

• To contact prescriber if adverse reactions occur

• To avoid iron- or mineral-containing supplements or aluminum/magnesium antacids, buffered products within 2 hr before and 3 hr after dosing, 2 hr before sucralfate

• That photosensitivity may occur and sunscreen should be used

• To use frequent rinsing of mouth, sugarless candy or gum for dry mouth

• To avoid other medication unless approved by prescriber

gentamicin (Rx)

(jen-ta-mye'sin)

Func. class.: Antiinfective

Chem. class.: Aminoglycoside

Do not confuse:

gentamicin/kanamycin

ACTION: Interferes with protein synthesis in bacterial cell by binding to ribosomal subunit, thus causing misreading of genetic code; inaccurate peptide sequence forms in protein chain, thereby causing bacterial death

USES: Severe systemic infections of CNS, respiratory, GI, urinary tract, bone, skin, soft tissues caused by susceptible strains of *Pseudomonas aeruginosa, Proteus, Klebsiella, Serratia, Escherichia coli, Enterobacter, Citrobacter, Staphylococcus, Shigella, Salmonella, Acinetobacter, Bacillus anthracis,* acute PID

CONTRAINDICATIONS: Hypersensitivity to this product, other aminoglycosides; fungal/viral/mycobacterial infection

Black Box Warning: Pregnancy (D), severe renal disease

Precautions: Breastfeeding, neonates, geriatric patients

Black Box Warning: Mild renal disease, hearing deficits, myasthenia gravis, Parkinson's disease, infant botulism

DOSAGE AND ROUTES

Severe systemic infections

• **Adult: IV INF** 3-5 mg/kg/day in divided doses q8hr; dilute in 50-200 ml 0.9% NaCl or D_5W given over 30 min-1 hr; **IV** (pulse dosing, once-daily dosing) (unlabeled) 5-7 mg/kg; **IM** 3 mg/kg/day in divided doses q8hr

• **Child: IM/IV** 2-2.5 mg/kg q8hr; **IV** (pulse dosing, once daily dosing) (unlabeled) 5 mg/kg
• **Neonate and infant: IM/IV** 2.5 mg/kg q8-12hr
• **Neonate <1 wk: IV** 2.5 mg/kg q12-24hr

Renal dose

• **Adult: IM/IV** CCr 70-100 ml/min, reduce dose by multiplying maintenance dose by 0.85, give q8-12hr; CCr 50-69 ml/min, reduce as above, give q12hr; CCr 25-49 ml/min, reduce as above, give q24hr; CCr <25 ml/min, reduce as above, give based on serum concentrations, give doses after dialysis

Available forms: Inj 10, 40 mg/ml; premixed inj 60, 80, 100 mg/50 ml, 120 mg/100 ml

Administer:

IM route

• IM inj in large muscle mass; rotate inj sites
• Product in evenly spaced doses to maintain blood level

Intermittent IV INF route

• After diluting in 50-200 ml NS, D_5W; decrease vol of diluent in child; maintain 0.1% sol run over $^1/_2$-1 hr (adults) or up to 2 hr (children); flush IV line with NS, D_5W after administration

Syringe compatibilities: Clindamycin

Y-site compatibilities: Amifostine, amiodarone, amsacrine, atracurium, aztreonam, cefpirome, ciprofloxacin, cyclophosphamide, cytarabine, diltiazem, enalaprilat, esmolol, famotidine, filgrastim, fluconazole, fludarabine, foscarnet, granisetron, HYDROmorphone, IL-2, insulin, labetalol, LORazepam, magnesium sulfate, melphalan, meperidine, meropenem, midazolam, morphine, multivitamins, ondansetron, PACLitaxel, pancuronium, perphenazine, sargramostim, tacrolimus, teniposide, theophylline, thiotepa, tolazine, vecuronium, vinorelbine, vit B/C, zidovudine

SIDE EFFECTS

CNS: Confusion, depression, numbness, tremors, seizures, muscle twitching, neurotoxicity, dizziness, vertigo
CV: Hypo/hypertension, palpitations, edema
EENT: Ototoxicity, *deafness,* visual disturbances, tinnitus
GI: *Nausea, vomiting, anorexia;* increased ALT, AST, bilirubin; hepatomegaly, hepatic necrosis, splenomegaly
GU: Oliguria, hematuria, renal damage, azotemia, renal failure, nephrotoxicity, proteinuria
HEMA: Agranulocytosis, thrombocytopenia, leukopenia, eosinophilia, anemia
INTEG: *Rash,* burning, urticaria, dermatitis, alopecia, photosensitivity

PHARMACOKINETICS

Not metabolized, excreted unchanged in urine, crosses placental barrier
IM: Onset rapid, peak 1-2 hr
IV: Onset immediate; peak 1-2 hr; plasma half-life 1-2 hr, infants 6-7 hr; duration 6-8 hr

INTERACTIONS

• Do not use at the same time or physically mix with penicillins

Black Box Warning: Increase: ototoxicity, neurotoxicity, nephrotoxicity—other aminoglycosides, amphotericin B, polymyxin, vancomycin, ethacrynic acid, furosemide, mannitol, methoxyflurane, CISplatin, cephalosporins, penicillins, cidofovir, acyclovir

Increase: effects—nondepolarizing neuromuscular blockers

Drug/Lab Test

Increase: LDH, AST, ALT, bilirubin, BUN, creatinine, eosinophils
Decrease: Hgb, WBC, platelet, granulocytes

NURSING CONSIDERATIONS

Assess:

Black Box Warning: **Neuromuscular disease (myasthenia gravis, Parkinson's disease, infant botulism):** paresthesias, tetany, positive Chvostek's/Trousseau's signs, confusion (adults), tetany, muscle weakness (infants); correct electrolyte imbalance

- Weight before treatment; calculation of dosage is usually based on ideal body weight but may be calculated on actual body weight

Black Box Warning: **Renal disease:** I&O ratio, urinalysis daily for proteinuria, cells, casts; report sudden change in urine output; urine pH if product is used for UTI; urine should be kept alkaline; urine for CCr testing, BUN, serum creatinine; lower dosage should be given with renal impairment (CCr <80 ml/min); toxicity is increased in patients with decreased renal function if high doses are given

- VS during inf; watch for hypotension, change in pulse
- IV site for thrombophlebitis, including pain, redness, swelling q30min, change site if needed; discontinue, apply warm compresses to site
- Serum peak drawn at 30-60 min after IV inf or 60 min after IM inj and trough level drawn just before next dose; blood level should be 2-4 times bacteriostatic level; peak (5-10 mcg/ml), trough (0.5-2 mcg/ml), depending on type of infection

Black Box Warning: **Hearing deficits:** eighth cranial nerve dysfunction by audiometric testing; also ringing, roaring in ears, vertigo; assess hearing before, during, after treatment

- Dehydration: high specific gravity, decrease in skin turgor, dry mucous membranes, dark urine
- **Overgrowth of infection:** fever, malaise, redness, pain, swelling, perineal itching, diarrhea, stomatitis, change in cough or sputum
- C&S before starting treatment to identify infecting organism
- **Vestibular dysfunction:** nausea, vomiting, dizziness, headache; product should be discontinued if severe
- Inj sites for redness, swelling, abscesses; use warm compresses at site

Perform/provide:

- Adequate fluids of 2-3 L/day unless contraindicated to prevent irritation of tubules
- Supervised ambulation, other safety measures with vestibular dysfunction

Evaluate:

- Therapeutic response: absence of fever, draining wounds, negative C&S after treatment

Teach patient/family:

- To report headache, dizziness, symptoms of overgrowth of infection, renal impairment

Black Box Warning: To report loss of hearing; ringing, roaring in ears; feeling of fullness in head

gentamicin (ophthalmic)

(jen-ta-mye'sin)

Gentak, Garamycin

Func. class.: Ophthalmic anti-infective

Chem. class.: Aminoglycoside

Do not confuse: clindamycin/tobramycin/erythromycin/vancomycin/GenTeal

ACTION: Inhibits protein synthesis, thereby decreasing bacterial replication

USES: External ocular infections

CONTRAINDICATIONS: Hypersensitivity to this product or aminoglycosides

Precautions: Pregnancy (C), breastfeeding

DOSAGE AND ROUTES

Ophthalmic (solution)

- **Adult/adolescent/child ≥1 mo: SOL** 1–2 drops in affected eye(s) every 4 hr while awake × 2 days, then every 4 hr; severe injections ≤2 drops every 1 hr

• **Ointment:** apply a small amount (1/2″) to lower conjunctival sac bid or tid

Available forms: Ophthalmic ointment, ophthalmic solution 0.3%

Administer:

Ophthalmic route

• Commercially available ophthalmic solutions are not for injection subconjunctivally or into the anterior chamber of the eye
• Apply topically to the eye, taking care to avoid contamination
• Do not to touch the tip of the dropper to the eye, fingertips, or other surface
• Apply pressure to lacrimal sac for 1 min after instillation
• To apply the ointment: pull down gently on lower eyelid, and apply a thin film of the ointment

SIDE EFFECTS

EENT: Burning, hypersensitivity, stinging, blurred vision, hyperemia, corneal ulcers

PHARMACOKINETICS

Unknown

NURSING CONSIDERATIONS

Assess:

• **Allergic reaction**: hypersensitivity, discontinue product

Evaluate:

• Decreased ophthalmic infection

Teach patient/family:

Ophthalmic route

• To apply topically to the eye, taking care to avoid contamination; for ophthalmic use only
• Not to touch the tip of the dropper to the eye, fingertips, or other surface
• To apply pressure to lacrimal sac for 1 min after instillation
• To apply the ointment by pulling down gently on lower eyelid, and applying a thin film of the ointment

gentamicin (topical)

(jen-ta-mye'sin)

Func. class.: Topical anti-infective

Chem. class.: Aminoglycoside

Do not confuse: gentamicin/clindamycin

ACTION

Antibacterial activity results from inhibition of protein synthesis; bactericidal

USES

Superficial infections

CONTRAINDICATIONS

Hypersensitivity to this product or other aminoglycosides

Precautions: Infections

DOSAGE AND ROUTES

• **Adult/child >1 yr:** Apply to affected areas tid-qid

Available forms: Topical cream, ointment 0.1%

Administer:

• For external use only; do not use skin products near the eyes, nose, or mouth
• Wash hands before and after use; wash affected area and gently pat dry
• **Cream/Ointment:** Apply to the cleansed affected area, massage gently into affected areas

SIDE EFFECTS

INTEG: Rash, irritation

PHARMACOKINETICS

Unknown

NURSING CONSIDERATIONS

Assess:

• **Allergic reaction**: hypersensitivity, product may need to be discontinued
• **Infection**: skin infection

Evaluate:

• Decreased skin infection

Teach patient/family:

- To use for external use only; do not use skin products near the eyes, nose, or mouth
- To wash hands before and after use, wash affected area and gently pat dry
- **Cream/Ointment:** To apply to the cleansed affected area and massage gently into affected areas

glatiramer (Rx)

(glah-tear'a-meer)

Copaxone

Func. class.: Multiple sclerosis agent

Chem. class.: Biological response modifier

ACTION: Unknown; may modify the immune responses responsible for multiple sclerosis (MS)

USES: Reduction of the frequency of relapses in patients with relapsing or remitting MS after first clinical episode with MRI results consistent with MS

CONTRAINDICATIONS: Hypersensitivity to this product or mannitol, IV use

Precautions: Pregnancy (B), breastfeeding, children <18 yr, immune disorders, renal disease, infection, vaccinations, geriatric patients

DOSAGE AND ROUTES

- **Adult: SUBCUT** 20 mg/day

Available forms: Inj, premixed 20 mg/ml and 40 mg mannitol in single use syringe

Administer:

SUBCUT route

- If refrigerated, allow to warm for 20 min; visually inspect for particulate or cloudiness, if present discard; prefilled syringe contents is for single use; administer SUBCUT into hip, thigh, arm; discard unused portion
- Use SUBCUT route only; do not give IM or IV

SIDE EFFECTS

CNS: *Anxiety, hypertonia, tremor, vertigo,* speech disorder, *agitation,* confusion, flushing

CV: *Migraine, palpitations, syncope, tachycardia, vasodilation,* chest pain, hypertension

EENT: *Ear pain, blurred vision*

GI: *Nausea, vomiting, diarrhea, anorexia, gastroenteritis*

GU: *Urinary urgency, dysmenorrhea, vaginal moniliasis*

HEMA: *Ecchymosis, lymphadenopathy*

INTEG: *Pruritus, rash, sweating, urticaria, erythema,* inj site reaction

META: Edema, weight gain

MS: *Arthralgia, back pain, neck pain,* increased muscle tone

RESP: *Bronchitis, dyspnea, laryngismus, rhinitis*

PHARMACOKINETICS

May be hydrolyzed locally, may reach regional lymph nodes

NURSING CONSIDERATIONS

Assess:

- CNS symptoms: anxiety, confusion, vertigo
- GI status: diarrhea, vomiting, abdominal pain, gastroenteritis
- Cardiac status: tachycardia, palpitations, vasodilation, chest pain

Evaluate:

- Therapeutic response: decreased symptoms of MS

Teach patient/family:

- With written, detailed instructions about product; provide initial and return demonstrations on inj procedure; give information about use and disposal of product, inj site reaction (hives, rash, irritation, severe pain, flushing, chest pain)
- To notify prescribers of allergic reactions including itching, trouble breathing; chest pain, dizziness, sweating
- That irregular menses, dysmenorrhea, metrorrhagia, breast pain may occur; to use contraception during treatment

- That if pregnancy is suspected or if nursing to notify prescriber
- Not to change dosing or stop taking product without advice of prescriber
- About **immediate postinjection reaction:** flushing, chest pain, palpitations, anxiety, dyspnea, laryngeal constriction, urticaria; does not usually require treatment, may occur months after beginning treatment
- To take as directed, not to stop product or change schedule; teach on self-injection technique

glimepiride (Rx)
(glye-me'pi-ride)
Amaryl
glipiZIDE (Rx)
(glip-i'zide)
Glucotrol, Glucotrol XL
Func. class.: Antidiabetic
Chem. class.: Sulfonylurea (2nd generation)

Do not confuse:
glipiZIDE/Glucotrol/glyBURIDE

ACTION: Causes functioning β cells in pancreas to release insulin, leading to drop in blood glucose levels; may improve insulin binding to insulin receptors or increase the number of insulin receptors with prolonged administration; may also reduce basal hepatic glucose secretion; not effective if patient lacks functioning β cells

USES: Type 2 diabetes mellitus

CONTRAINDICATIONS: Hypersensitivity to sulfonylureas, type 1 diabetes, diabetic ketoacidosis
Precautions: Pregnancy (C), geriatric patients, cardiac disease, severe renal/hepatic disease, G6PD deficiency

DOSAGE AND ROUTES

Glimepiride

- **Adult: PO** 1-2 mg/day with breakfast, then increase by ≤2 mg/day q1-2wk, max 8 mg/day
- **Geriatric: PO** 1 mg/day; may increase if needed

Renal dose

- **Adult: PO** 1 mg/day with breakfast; may titrate upward as needed

GlipiZIDE

- **Adult: PO** 5 mg initially before breakfast then increase by 2.5-5 mg after several days to desired response; max 40 mg/day in divided doses or 15 mg/dose; **PO** (XL) 5 mg/day with breakfast, may increase to 10 mg/day, max 20 mg/day
- **Geriatric: PO** 2.5 mg/day; may increase if needed

Hepatic disease

- **Adult: PO** 2.5 mg initially then increase to desired response; max 40 mg/day in divided doses or 15 mg/dose

Available forms: *Glimepiride:* tabs 1, 2, 4 mg; *glipiZIDE:* tabs, scored 5, 10 mg; ext rel tab (XL) 2.5, 5, 10 mg
Administer:

- Do not break, crush, or chew ext rel tabs; may crush tabs and mix with fluids if unable to swallow whole
- **GlipiZIDE:** product 30 min before meals (regular release); with breakfast (ext rel); **Glimepiride:** with breakfast; if patient is NPO, may need to hold dose to prevent hypoglycemia
- Gradual conversion from other oral hypoglycemics to these products is not needed; insulin ≥20 units/day, convert using 25% reduction in insulin dose every day or every other day

SIDE EFFECTS

CNS: *Headache, weakness, dizziness, drowsiness,* tinnitus, fatigue, vertigo
ENDO: Hypoglycemia
GI: Hepatotoxicity, cholestatic jaundice, nausea, vomiting, diarrhea, heartburn
HEMA: Leukopenia, thrombocytopenia, agranulocytosis, aplastic anemia; in-

creased AST, ALT, alk phos; pancytopenia, hemolytic anemia
INTEG: Rash, allergic reactions, pruritus, urticaria, eczema, photosensitivity, erythema, allergic vasculitis

PHARMACOKINETICS

PO: Completely absorbed by GI route; **glipiZIDE:** onset 1-1½ hr, peak 1-3 hr, duration 10-24 hr, half-life 2-4 hr; **glimepiride:** peak 2-3 hr, half-life 5 hr; metabolized in liver, excreted in urine, 90%-95% plasma-protein bound

INTERACTIONS

• May mask symptoms of hypoglycemia: β-blockers
Increase: action of digoxin, glycosides
Increase: hypoglycemic effects—insulin, MAOIs, cimetidine, chloramphenicol, guanethidine, methyldopa, NSAIDs, salicylates, probenecid, androgens, anticoagulants, clofibrate, fenfluramine, fluconazole, gemfibrozil, histamine H_2 antagonists, magnesium salts, phenylbutazone, sulfinpyrazone, sulfonamides, tricyclics, urinary acidifiers, clarithromycin, fibric acid derivatives, voriconazole
Decrease: hypoglycemic effect—thiazide diuretics, rifampin, isoniazid, cholestyramine, diazoxide, hydantoins, urinary alkalinizers, charcoal, corticosteroids
Drug/Herb
Increase: antidiabetic effect—garlic, horse chestnut
Decrease: hypoglycemic effect—green tea
Drug/Lab Test
Increase: AST, ALT, LDH, BUN, creatinine

NURSING CONSIDERATIONS

Assess:
• **Hypo/hyperglycemic reaction** that can occur soon after meals; for severe hypoglycemia give IV $D_{50}W$, then IV dextrose solution
• Blood glucose, A1c levels during treatment to determine diabetes control
⚠ Blood dyscrasias: CBC at baseline and throughout treatment; report decreased blood count
Perform/provide:
• Storage in tight, light-resistant container at room temp
Evaluate:
• Therapeutic response: decrease in polyuria, polydipsia, polyphagia; clear sensorium; absence of dizziness; stable gait; improved serum glucose, A1c
Teach patient/family:
• Not to drink alcohol; about disulfiram reaction (nausea, headache, cramps, flushing, hypoglycemia)
• To report bleeding, bruising, weight gain, edema, SOB, weakness, sore throat
• To check for symptoms of cholestatic jaundice: dark urine, pruritus, yellow sclera; prescriber should be notified
• About symptoms of hypo/hyperglycemia, what to do about each; to have glucagon emergency kit available; to carry sugar packets
• That product must be continued on daily basis; about consequences of discontinuing product abruptly; to take product in morning to prevent hypoglycemic reactions at night
• To use sunscreen or stay out of the sun, wear protective clothing (photosensitivity)
• To avoid OTC medications unless ordered by prescriber
• That diabetes is a lifelong illness; product will not cure disease
• That all food in diet plan must be eaten to prevent hypoglycemia; to continue weight control, dietary restrictions, exercise, hygiene
• To carry emergency ID with prescriber and medication information
• To test using blood glucose meter while taking this product
• That ext rel tab may appear in stool

TREATMENT OF OVERDOSE:

Glucose 25 g IV via dextrose 50% sol, 50 ml, 1 mg glucagon, or carbohydrate depending on severity

G

glucagon

(gloo'ka-gon)

GlucaGen

Func. class.: Antihypoglycemic

ACTION: Increases in blood glucose, relaxation of smooth muscle of the GI tract, and a positive inotropic and chronotropic effect on the heart; increases in blood glucose are secondary to stimulation of glycogenolysis

USES: Hypoglycemia, used to temporarily inhibit movement of GI tract as a diagnostic test

CONTRAINDICATIONS: Hypersensitivity, pheochromocytoma, insulinoma

Precautions: Pregnancy (B), breastfeeding, cardiac disease, adrenal insufficiency

DOSAGE AND ROUTES

Hypoglycemia in those with diabetes mellitus

- **Adult/adolescent/child ≥55 lb (25 kg): IM/IV/SUBCUT (GlucaGen)** 1 mg (1 IU)
- **Child <55 lb (25 kg) or <6-8 yr: IM/IV/SUBCUT** 0.5 mg (0.5 IU) (Glucagon)
- **Adult/adolescent/child ≥44 lb (20 kg): IM/IV/SUBCUT** (Glucagon) 1 mg (1IU)
- **Child <44 lb (20 kg):** (Glucagon) 0.5 mg (0.5 IU) or 0.02–0.03 mg/kg (IU/kg) max/mg

Available forms: Powder for injection 1-mg vial

Administer:

- Visually inspect for particulate matter and discoloration before use

Reconstitution: Reconstitute with 1 ml of sterile water for injection or with diluent supplied by the manufacturer; the reconstituted injection should be clear and of water-like consistency (1 mg/ml); discard any unused portion

IM route

- Inject into a large muscle mass; aspirate before injection to avoid injection into a blood vessel

SUBCUT route

- Inject, taking care not to inject intradermally

IV route

- Inject directly into a vein at a rate ≤1 IU/min (mg/min); may be given through line running D_5W or given at the same time as a bolus of dextrose

SIDE EFFECTS

CNS: Dizziness, headache
CV: Hypotension
GI: Nausea, vomiting
SYST: Hypersensitivity

PHARMACOKINETICS

IV: Onset immediate, peak 30 min, duration 1-1½ hr
IM/subcut: Onset 5-10 min, peak 13-20 min, duration 12-30 min

INTERACTIONS

Increase: Increased bleeding risk—anticoagulants

NURSING CONSIDERATIONS

Assess:

- **Hypoglycemia:** Monitor glucose levels before and after product use; use other products to control hypoglycemia if patient is conscious

Evaluate:

- Decreased hypoglycemia

Teach patient/family:

- How to use this product, symptoms of hypoglycemia

glucarpidase

(glu-car-pie'dase)

Voraxaze

Func. class.: Recombinant bacterial enzyme

ACTION: A recombinant bacterial enzyme that hydrolyzes glutamate residue from methotrexate and provides an alternate nonrenal pathway for methotrexate elimination in patients with renal dysfunction during high-dose methotrexate treatment. As a result of its enzymatic action, converts methotrexate to its inactive metabolites

USES: The treatment of methotrexate toxicity (methotrexate plasma concentration >1 micromole/liter) in those with delayed methotrexate clearance due to impaired renal function

Precautions: Pregnancy (C), breastfeeding

DOSAGE AND ROUTES

• **Adult/adolescent/child: IV** 50 units/kg over 5min; continue to give leucovorin, IV hydration, urinary alkalinization as needed

Available forms: Sol for IV

Administer:

IV direct route

• Visually inspect parenteral products for particulate matter and discoloration prior to administration

• Reconstitution: add 1 ml of sterile saline for injection to vial, roll and tilt the vial gently to mix; do not shake; flush the IV line then inject as a bolus inj over 5 min; flush the IV line again

• Do not administer to patients who exhibit the expected clearance of methotrexate (plasma methotrexate concentrations within 2 standard deviations of the mean methotrexate excretion curve specific for the dose of methotrexate administered)

• Do not administer to patients with normal or mildly impaired renal function because of the potential risk of subtherapeutic exposure to methotrexate

• Continue to administer leucovorin after glucarpidase, but do not administer leucovorin within 2 hr before or after a glucarpidase. For the first 48 hr after glucarpidase administration, administer the same leucovorin dose as given before glucarpidase. After 48 hr after glucarpidase, administer leucovorin based on the measured methotrexate concentration. Do not discontinue therapy with leucovorin based on the determination of a single methotrexate concentration below the leucovorin treatment threshold. Continue leucovorin until the methotrexate concentration has been maintained below the leucovorin treatment threshold for a minimum of 3 days; use of a chromatographic method to determine methotrexate concentrations is needed for the first 48 hr after glucarpidase receipt

• Continue hydration and alkalinization of the urine as needed

SIDE EFFECTS

CNS: Paresthesias, headache

CV: Hypo/hypertension

EENT: Throat irritation or tightness

GI: Nausea, vomiting

INTEG: Flushing, hot, burning sensation; rash, hypersensitivity, serious allergic reactions

SYST: Antibody formation

PHARMACOKINETICS

Elimination half-life of 5.6 hr, methotrexate concentration reduced 97% within 15 min

INTERACTIONS

Decrease: elucarpidase level—PEMEtrexed, PRALAtrexate; avoid concurrent use

NURSING CONSIDERATIONS

Assess:

• Continue monitoring of methotrexate blood levels, renal status (creatinine/BUN) after glucarpidase is given. Methotrexate concentrations within 48 hr of glucarpidase are only reliable measure by a chromatographic method. Leucovorin receipt is needed until methotrexate level has been maintained below leucovorin treatment threshold for a minimum of 3 days

Perform/provide:

• Storage of reconstituted solution refrigerated ≤4 hr; discard any unused product, no preservative is present

Evaluate:

• For resolution of methotrexate toxicity

Teach patient/family:

• To immediately report any infusion-related reactions: fever, chills, flushing, feeling hot, rash, hives, itching, throat tightness or breathing problems, tingling, numbness, or headache

glyBURIDE (Rx)

(glye'byoor-ide)

DiaBeta, Glynase PresTab

Func. class.: Antidiabetic

Chem. class.: Sulfonylurea (2nd generation)

Do not confuse:

glyBURIDE/Glucotrol/glipiZIDE

DiaBeta/Zebeta

ACTION: Causes functioning β cells in pancreas to release insulin, thereby leading to a drop in blood glucose levels; may improve insulin binding to insulin receptors and increase number of insulin receptors with prolonged administration; may also reduce basal hepatic glucose secretion; not effective if patient lacks functioning β cells

USES: Type 2 diabetes mellitus

Unlabeled use: Gestational diabetes not controlled by diet

CONTRAINDICATIONS: Hypersensitivity to sulfonylureas, type 1 diabetes, diabetic ketoacidosis, renal failure

Precautions: Pregnancy (B) Glynase; (C) Diabeta, geriatric patients, cardiac/thyroid disease, severe renal/hepatic disease, severe hypoglycemic reactions, sulfonamide/sulfonylurea hypersensitivity, G6PD deficiency

DOSAGE AND ROUTES

DiaBeta (nonmicronized)

• **Adult: PO** 1.25-5 mg initially then increase to desired response at weekly intervals up to 20 mg/day; may be given as a single or divided dose

• **Geriatric: PO** 1.25 mg initially then increase to desired response; max 20 mg/day, maintenance 1.25-20 mg/day

Glynase PresTab (micronized)

• **Adult: PO** 1.5-3 mg/day initially, may increase by 1.5 mg/wk, max 12 mg/day

• **Geriatric: PO** 0.75-3 mg/day, may increase by 1.5 mg/wk

Gestational diabetes (unlabeled)

• **Adult (pregnant female): PO** 2.5 mg/day titrated up to 20 mg/day (conventional glyBURIDE)

Available forms: Tabs (DiaBeta) 1.25, 2.5, 5 mg (nonmicronized); (Glynase PresTab) 1.5, 3, 6 mg (micronized)

Administer:

• With breakfast as single or divided dose, hold dose if patient NPO to avoid hypoglycemia, take at same time each day

• Gradual conversion from other oral hypoglycemics to product is not needed; insulin ≥20 units/day; convert using 25% reduction in insulin dose every day

• Micronized glyBURIDE/nonmicronized glyBURIDE are not equivalent

SIDE EFFECTS

CNS: *Headache, weakness,* paresthesia, tinnitus, fatigue, vertigo

EENT: Blurred vision

ENDO: Hypoglycemia

GI: Nausea, fullness, heartburn, hepatotoxicity, cholestatic jaundice, vomiting, diarrhea, hepatic failure
HEMA: Leukopenia, thrombocytopenia, agranulocytosis, aplastic anemia (rare), increased AST, ALT, alk phos
INTEG: Rash, allergic reactions, pruritus, urticaria, eczema, photosensitivity, erythema
MISC: Angioedema
MS: Joint pain

PHARMACOKINETICS

PO: Completely absorbed by GI route; onset 2 hr; peak 2-4 hr; duration 24 hr; half-life 10 hr; metabolized in liver; excreted in urine, feces (metabolites); crosses placenta; 99% plasma-protein bound

INTERACTIONS

Increase: masking symptoms of hypoglycemia—β-blockers
Increase: level—digoxin
Increase: hypoglycemic effects—insulin, MAOIs, oral anticoagulants, chloramphenicol, guanethidine, methyldopa, NSAIDs, salicylates, probenecid, androgens, fenfluramine, fluconazole, gemfibrozil, histamine H_2 antagonists, magnesium salts, phenylbutazone, sulfinpyrazone, sulfonamides, tricyclics, urinary acidifiers, β-blockers, clarithromycin
Increase: LFTs—bosentan; avoid concurrent use
Increase: triglyceride levels—colesevelam
Increase: action of—cycloSPORINE
Decrease: both products' effects—diazoxide
Decrease: glyBURIDE action—thiazide diuretics, rifampin, isoniazid, cholestyramine, hydantoins, urinary alkalinizers, charcoal, corticosteroids, phenothiazines; oral contraceptives, estrogens, thyroid, voriconazole

Drug/Herb
Increase: antidiabetic effect—garlic, horse chestnut
Decrease: hypoglycemic effect—green tea

Drug/Lab Test
Increase: AST, ALT, LDH, BUN, creatinine
Decrease: Hgb, sodium, glucose

NURSING CONSIDERATIONS

Assess:
- Hypo/hyperglycemic reaction that can occur soon after meals; for severe hypoglycemia, give IV $D_{50}W$ then IV dextrose sol
- Blood glucose; A1c levels during treatment
- **Blood dyscrasias:** CBC at baseline, throughout treatment; report decreased blood counts

Perform/provide:
- Storage in tight container in cool environment

Evaluate:
- Therapeutic response: decrease in polyuria, polydipsia, polyphagia; clear sensorium; absence of dizziness; stable gait; improved serum glucose, A1c

Teach patient/family:
- To check for symptoms of cholestatic jaundice: dark urine, pruritus, jaundiced sclera; if these occur, notify prescriber
- To use a blood glucose meter for testing while taking this product
- About the symptoms of hypo/hyperglycemia, what to do about each
- That product must be continued on a daily basis; about consequences of discontinuing product abruptly; that in times of stress, infection, surgery, trauma, a higher dose may be needed
- To take product in morning to prevent hypoglycemic reactions at night if taking once a day
- To avoid OTC medications unless ordered by prescriber
- To report bleeding, bruising, weight gain, edema, shortness of breath, weakness, sore throat
- That diabetes is a lifelong illness; that product will not cure disease
- That all food included in diet plan must be eaten to prevent hypoglycemia;

to have glucagon emergency kit, sugar packets always available
• To use sunscreen or stay out of the sun, wear protective clothing (photosensitivity)
• To carry an emergency ID with prescriber and medication information

TREATMENT OF OVERDOSE: Glucose 25 g IV via dextrose 50% sol, 50 ml, 1 mg glucagon, or carbohydrate depending on severity

RARELY USED

glycerin (OTC)

(gli'ser-in)

Sani-Supp

Func. class.: Laxative, hyperosmotic

USES: Constipation

CONTRAINDICATIONS: Hypersensitivity

DOSAGE AND ROUTES

Laxative

• **Adult and child >6 yr: RECT SUPP** 3 g; **ENEMA** 5-15 ml
• **Child <6 yr: RECT SUPP** 1-1.8 g; **ENEMA** 2-5 ml

golimumab (Rx)

(goal-lim'yu-mab)

Simponi

Func. class.: Antirheumatic agent (disease modifying), immunomodulator

Chem. class.: Monoclonal antibody, DMARD, tumor necrosis factor (TNF-α) modifier

ACTION: Monoclonal antibody specific for human tumor necrosis factor (TNF); elevated levels of TNF are found in patients with rheumatoid arthritis

USES: Rheumatoid arthritis (RA), ankylosing spondylitis, psoriatic arthritis

CONTRAINDICATIONS: Hypersensitivity, active infections

Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, CNS demyelinating disease, Guillain-Barré syndrome, CHF, hepatitis B carriers, blood dyscrasias, surgery, MS, neurologic disease, diabetes, immunosuppression

Black Box Warning: Neoplastic disease, TB; fungal, bacterial, viral infections

DOSAGE AND ROUTES

• **Adult: SUBCUT** 50 mg q month; for RA, give with methotrexate

Available form: Inj 50 mg/0.5 ml prefilled syringe, SmartJect Auto Injector

Administer:

SUBCUT route

• Visually inspect sol for particulate or discoloration, sol should be clear to slightly opalescent and colorless to slightly yellow, there may be tiny white particles; do not shake; rotate injection sites
• **SmartJect autoinjector:** Allow to reach room temp for 30 min before use; remove cap, and inject within 5 min of removing cap, do not put cap back on, place open end against the inj site at a 90-degree angle without pushing button, push the injector firmly against the skin, press the button once and release, listen for the first click, wait for the second click or 15 sec, then remove injector; do not rub site
• **Prefilled syringe:** Allow to warm to room temp for 30 min, remove needle cover by pulling straight off, do not twist or recap, inject within 5 min of needle cover removal, hold syringe in one hand like a pencil and use other hand to pinch the skin, inject needle at a 45-degree angle, push plunger down as far as it will go, keep pressure on plunger head and remove needle from skin, remove pres-

sure from plunger head, needle guard will cover needle; do not rub site

SIDE EFFECTS

CNS: Dizziness, paresthesia, CNS demyelinating disorder, weakness
CV: Hypertension, CHF
GI: Hepatitis
HEMA: Agranulocytosis, aplastic anemia, leukopenia, polycythemia, thrombocytopenia, pancytopenia
INTEG: Psoriasis
MISC: Increased cancer risk, antibody development to this drug; risk for infection (TB, invasive fungal infections, other opportunistic infections), may be fatal, inj site reactions

PHARMACOKINETICS

Terminal half-life 2 wk, lower

INTERACTIONS

• Do not give concurrently with vaccines; immunizations should be brought up to date before treatment
• Dosage change may be needed: warfarin, cycloSPORINE, theophylline
Increase: infection—abatacept, etanercept, rilonacept, riTUXimab, adalimumab, anakinra, immunosuppressants, inFLIXimab

NURSING CONSIDERATIONS

Assess:
• **Pain,** stiffness, ROM, swelling of joints during treatment
• Inj site pain, swelling; usually occur after 2 inj (4-5 days)

Black Box Warning: TB: obtain TB skin test before starting treatment, treat latent TB before starting therapy

Blood dyscrasias: CBC, differential prior to and periodically during treatment

Black Box Warning: Infection: fever, flulike symptoms, dyspnea, change in urination, redness/ swelling around any wounds; stop treatment if present; some serious infections including sepsis may occur, may be fatal; patients with active infections should not be started on this product; obtain a chest x-ray, fungal serology, TB testing before starting treatment

• LFTs; hepatitis B serology, may reactivate HBV
• **CHF:** B/P, pulse, edema, SOB
• **Psoriasis:** may occur or worsen

Black Box Warning: Neoplastic disease: may occur in those <18 yr, avoid use in those with known malignancies

Perform/provide:
• Refrigerate, do not freeze; allow to warm to room temp before using
Evaluate:
• Therapeutic response: decreased inflammation, pain in joints, decreased joint destruction
Teach patient/family:
• About self-administration if appropriate: inj should be made in thigh, abdomen, upper arm; rotate sites at least 1 inch from old site, do not inject in areas that are bruised, red, hard
• That, if medication not taken when due, to inject next dose as soon as remembered and then the following dose as scheduled
• Not to receive any live virus vaccines during treatment

Black Box Warning: To report signs, symptoms of infection, allergic reaction, or lupuslike syndrome

• To notify prescriber if pregnancy is planned or suspected, not to breastfeed

goserelin (Rx)

(goe'se-rel-lin)
Zoladex
Func. class.: Gonadotropin-releasing hormone, antineoplastic (hormone)
Chem. class.: Synthetic decapeptide analog of LHRH

ACTION: Inhibitor of pituitary gonadotropin secretion; initially increases LH and FSH, with increases in testoster-

one, reduction in sex steroid levels (substitute serum testosterone levels)

USES: Advanced and locally confined prostate cancer stage B2-C (10.8 mg), endometriosis, advanced breast cancer, endometrial thinning (3.6 mg)

CONTRAINDICATIONS: Hypersensitivity; pregnancy D (breast cancer), X (endometriosis); breastfeeding, children, nondiagnosed vaginal bleeding; hypersensitivity to LHRH, LHRH-agonist analogs; 10.8 mg dose contraindicated in women

Precautions: Spinal cord decompression, renal disease, bone mineral density loss, hyperglycemia, diabetes mellitus, CV disease

DOSAGE AND ROUTES

Breast cancer

• **Adult: SUBCUT** 3.6 mg q28days or 10.8 mg q12wk

Endometrial thinning

• **Adult: SUBCUT** 3.6 mg 1-2 depot inj, usually 1 depot, surgery performed at 4 wk; if 2 depots, surgery performed 2-4 wk after 2nd depot

Available forms: Depot inj 3.6, 10.8 mg

Administer:

Depot

• SUBCUT using implant, inserted by qualified person into upper subcutaneous tissue in abdominal wall q28days or q12wk (10.8 mg); do not attempt to remove air bubbles from syringe

SIDE EFFECTS

CNS: *Headaches,* spinal cord compression, *anxiety, depression, dizziness, insomnia, lethargy,* hot flashes, emotional lability

CV: Dysrhythmia, cerebrovascular accident, hypertension, chest pain, CHF; MI, sudden cardiac death, stroke (men), *peripheral edema*

ENDO: Gynecomastia, breast tenderness, breast enlargement, *hot flashes;* hyperglycemia, diabetes (men)

GI: *Nausea,* vomiting, constipation, diarrhea, ulcer

GU: *Spotting, breakthrough bleeding, decreased libido,* renal insufficiency, urinary obstruction, urinary tract infection, *impotence*

INTEG: Rash, pain on inj, diaphoresis

MS: Osteoneuralgia

RESP: COPD, URI

PHARMACOKINETICS

Peak 12-15 days, half-life 4½ hr, 30% protein bound

INTERACTIONS

Drug/Lab Test

Increase: alk phos, estradiol, FSH, LH, testosterone levels, triglycerides

Decrease: testosterone levels, progesterone

NURSING CONSIDERATIONS

Assess:

• **Reproductive studies:** pelvic ultrasound, pelvic exam, PSA, serum estradiol/testosterone, pregnancy test prior to therapy

• I&O ratios; palpate bladder for distention in urinary obstruction

• **Cancer metastases:** for relief of bone pain (back pain), change in motor function

• Blood studies: lipid profile, acid phosphatase; calcium; hypercalcemia may occur

Evaluate:

• Therapeutic response: more normal levels of PSA, acid phosphatase, alk phos; testosterone level of <25 ng/dl; thinning of endometrial lining

Teach patient/family:

• To continue with appointments monthly

• That hyperglycemia may occur in diabetic patients

- That gynecomastia and postmenopausal symptoms may occur but will decrease when treatment is discontinued
- That bone pain may increase then decrease
- To notify prescriber of difficulty urinating, hot flashes
- Not to breastfeed; to use effective nonhormonal contraception; to notify prescriber if menstrual period continues

granisetron (Rx)

(grane-iss'e-tron)

Granisol, Kytril, Sancuso

Func. class.: Antiemetic

Chem. class.: 5-HT_3 receptor antagonist

ACTION: Prevents nausea, vomiting by blocking serotonin peripherally, centrally, and in the small intestine

USES: Prevention of nausea, vomiting associated with cancer chemotherapy, including high-dose CISplatin, radiation
Unlabeled uses: Acute nausea, vomiting after surgery

CONTRAINDICATIONS: Hypersensitivity to this product, benzyl alcohol
Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, ondansetron/palonosetron/dolasetron hypersensitivity, cardiac dysrhythmias, cardiac/hepatic disease, electrolyte imbalances

DOSAGE AND ROUTES

Nausea, vomiting in chemotherapy

- **Adult and child ≥2 yr: IV** 10 mcg/kg over 5 min, 30 min before the start of cancer chemotherapy; **TD** apply 1 patch (3.1 mg/24 hr) to upper outer arm 24-48 hr before chemotherapy, patch may be worn up to 7 days
- **Adult: PO** 1 mg bid, give 1st dose 1 hr before chemotherapy and next dose 12 hr after 1st or 2 mg as a single dose anytime within 1 hr prior to chemotherapy

Nausea, vomiting in radiation therapy

- **Adult: PO** 2 mg/day 1 hr before radiation

Available forms: Inj 1 mg/ml; tab 1 mg; oral sol 2 mg/10 ml; patch TD 3.1 mg/24 hr

Administer:

- Chemotherapy/radiation: given on day of chemotherapy or radiation

PO route

- Give dose 1 hr before chemotherapy/radiation and another 12 hr after 1st dose

Direct IV route

- May give undiluted over 30 sec via Y-site

Intermittent IV INF route

- Dilute in 0.9% NaCl for inj or D_5W (20-50 ml); give over 5-15 min 30 min before chemotherapy

Additive compatibilities: Dexamethasone, methylPREDNISolone
Solution compatibilities: D_5W, 0.9% NaCl
Y-site compatibilities: Acyclovir, allopurinol, amifostine, amikacin, aminophylline, amphotericin B cholesteryl, ampicillin, ampicillin/sulbactam, amsacrine, aztreonam, bleomycin, bumetanide, buprenorphine, butorphanol, calcium gluconate, CARBOplatin, carmustine, ceFAZolin, cefepime, cefonicid, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, ceftAZidime, ceftizoxime, ceftRIAXone, cefuroxime, chlorproMAZINE, cimetidine, ciprofloxacin, CISplatin, cladribine, clindamycin, cyclophosphamide, cytarabine, dacarbazine, DACTINomycin, DAUNOrubicin, dexamethasone, diphenhydrAMINE, DOBUTamine, DOPamine, DOXOrubicin, DOXOrubicin liposome, doxycycline, droperidol, enalaprilat, etoposide, famotidine, filgrastim, fluconazole, fluorouracil, floxuridine, fludarabine, furosemide, gallium, ganciclovir, gentamicin,

haloperidol, heparin hydrocortisone, HYDROmorphone, hydrOXYzine, IDArubicin, ifosfamide, imipenem-cilastatin, leucovorin, LORazepam, magnesium sulfate, melphalan, meperidine, mesna, methotrexate, methylPREDNISolone, metoclopramide, metroNIDAZOLE, mezlocillin, miconazole, minocycline, mitoMYcin, mitoXANtrone, morphine, nalbuphine, netilmicin, ofloxacin, PACLitaxel, piperacillin, piperacillin/tazobactam, plicamycin, potassium chloride, prochlorperazine, promethazine, propofol, ranitidine, sargramostim, sodium bicarbonate, streptozocin, teniposide, thiotepa, ticarcillin, ticarcillin/clavulanate, tobramycin, trimethoprim-sulfamethoxazole, vancomycin, vinBLAStine, vinCRISTine, vinorelbine, zidovudine

Transdermal route

• Apply to dry, clean, intact skin of upper outer arm 24-48 hr before chemotherapy, firmly press on skin, keep on during chemotherapy; can bathe, avoid swimming, whirlpool; remove ≥24 hr after chemotherapy completion, do not cut patch

SIDE EFFECTS

CNS: *Headache, asthenia,* anxiety, dizziness

CV: Hypertension, QT prolongation

GI: Diarrhea, *constipation,* increased AST, ALT, *nausea*

HEMA: Leukopenia, anemia, thrombocytopenia

MISC: Rash, bronchospasm

PHARMACOKINETICS

Metabolized in liver to an active metabolite, half-life 10-12 hr, protein binding 65%

INTERACTIONS

Increase: EPS—antipsychotics

Increase: QT prolongation—amoxapine, β-blockers, chloroquine, class IA, III antidysrhythmics, clozapine, dasatinib, dolasetron, dronedarone, droperidol, erythromycin, flecainide, halogenated/local anesthetics, haloperidol, lapatinib, maprotiline, methadone, octreotide, ondansetron, palonosetron, pentamidine, phenothiazines, pimozide, propafenone, ranolazine, risperiDONE, sertindole, SUNItinib, tacrolimus, telithromycin, tricyclics, troleandomycin, vardenafil, vorinostat, ziprasidone

NURSING CONSIDERATIONS

Assess:

• For absence of nausea, vomiting during chemotherapy

• **Hypersensitivity reaction:** rash, bronchospasm

Perform/provide:

• Storage at room temp for 24 hr after dilution

Evaluate:

• Therapeutic response: absence of nausea, vomiting during cancer chemotherapy

Teach patient/family:

• To report diarrhea, constipation, rash, changes in respirations

• That headache requiring an analgesic is common

guaiFENesin (OTC, Rx)

(gwye-fen'e-sin)

Alfen, Altarussin, Balminil ✤, Bidex, Diabetic Tussin, Elix Sure EX, Equaline Non-Drowsy Tussin, Equate Tussin Cough, Good Sense Mucus Relief, Good Sense Tussin Chest Congestion, Guaifenesin NR, Guiatuss, Humibid, Iophen NR, Liquibid, Miltuss EX, Mucinex, Mucinex Children's Mucus Relief, Mucinex Junior Strength, Naldecon Senior EX, Organ-1NR, Organidin NR, Q-Tussin, Robafen, Scot-Tussin Expectorant, Siltussin DAS, Siltussin SA, Top Care Children's Mucus Relief, Top Care Tussin Chest Congestion Solution, Wal-Tussin Expectorant, XPect

Func. class.: Expectorant

ACTION: Increases the volume and reduces the viscosity of secretions in the trachea and bronchi to facilitate secretion removal

USES: Productive and nonproductive cough

CONTRAINDICATIONS: Hypersensitivity; chronic, persistent cough

Precautions: Pregnancy (C), breastfeeding, CHF, asthma, emphysema, fever

DOSAGE AND ROUTES

- **Adult and adolescent: PO** 200-400 mg q4hr; **EXT REL** 600-1200 mg q12hr, max 2.4 g/day
- **Child 6-11 yr: PO** 100-200 mg q4hr; **EXT REL** 600 mg q12hr, max 1.2 g/day
- **Child 2-5 yr: PO** 50-100 mg q4hr; max 600 mg/day; ext rel 300 mg q12hr, max 600 mg/day

Available forms: Tabs 200, 400 mg; oral sol 100 mg/5 ml; ext rel tabs 600, 1200 mg; syrup 100 mg/5 ml; oral granules 50, 100 mg/packet

Administer:

- Do not break, crush, chew ext rel tabs

SIDE EFFECTS

CNS: Drowsiness, headache, dizziness

GI: Nausea, anorexia, vomiting, diarrhea

PHARMACOKINETICS

Half-life 1 hr, excreted in urine (metabolites)

NURSING CONSIDERATIONS

Assess:

- **Cough:** type, frequency, character, including sputum; fluids should be increased to 2 L/day

Perform/provide:

- Storage at room temp
- Increased fluids, room humidification to liquefy secretions

Evaluate:

- Therapeutic response: productive cough, thinner secretions

Teach patient/family:

- To avoid driving, other hazardous activities if drowsiness occurs (rare)
- To avoid smoking, smoke-filled room, perfumes, dust, environmental pollutants, cleansers
- To consult health provider if cough lasts >7 days

halcinonide topical

See Appendix B

haloperidol (Rx)

(hal-oh-pehr'ih-dol)

haloperidol decanoate (Rx)

Haldol Decanoate

haloperidol lactate (Rx)

Haldol

Func. class.: Antipsychotic, neuroleptic

Chem. class.: Butyrophenone

Do not confuse:
haloperidol/Halotestin

ACTION: Depresses cerebral cortex, hypothalamus, limbic system, which control activity and aggression; blocks neurotransmission produced by DOPamine at synapse; exhibits strong α-adrenergic, anticholinergic blocking action; mechanism for antipsychotic effects unclear

USES: Psychotic disorders, control of tics, vocal utterances in Gilles de la Tourette's syndrome, short-term treatment of hyperactive children showing excessive motor activity, prolonged parenteral therapy in chronic schizophrenia, organic mental syndrome with psychotic features, hiccups (short-term), emergency sedation of severely agitated or delirious patients, ADHD
Unlabeled uses: Nausea, vomiting during surgery; autism; migraine

CONTRAINDICATIONS: Children <3 yr, hypersensitivity, blood dyscrasias, coma, brain damage, bone marrow depression, alcohol and barbiturate withdrawal states, Parkinson's disease, angina, epilepsy, urinary retention, closed-angle glaucoma
Precautions: Pregnancy (C), breastfeeding, geriatric patients, seizure disorders, hypertension, pulmonary/cardiac/hepatic disease, QT prolongation, torsade de pointes

Black Box Warning: Increased mortality in elderly patients with dementia-related psychosis

DOSAGE AND ROUTES

Acute psychosis
- **Adult: IM/IV** (lactate) 2-10 mg, may repeat q1hr, convert to **PO** as soon as possible, **PO** should be 150% of total parenteral dose required
- **Child 6-12 yr: IM/IV** (lactate) (unlabeled) 1-3 mg q4-8hr, max 0.15 mg/kg/day, switch to **PO** as soon as possible

Chronic schizophrenia
- **Adult: IM** (decanoate) 50-100 mg q4wk, max 100 mg for 1st inj
- **Child 3-12 yr: PO/IM** 0.05-0.15 mg/kg/day

Tourette's syndrome
- **Adult and adolescent: PO** 0.5-2 mg bid-tid, increase until desired response occurs
- **Child 3-12 yr or weighing 15-40 kg: PO** 0.25-0.5 mg/day in 2-3 divided doses, increase by 0.25-0.5 mg q5-7days, max 0.15 mg/kg/day

ADHD
- **Child 3-12 yr: PO** 0.25-0.5 mg/day in 2-3 divided doses, may increase by 0.025-0.5 mg q5-7days; maintenance 0.01-0.03 mg/kg/day as a single dose

Autism (unlabeled)
- **Child: PO** 0.04 mg/kg/day or 1-3 mg/day, max 4 mg/day

Migraine (unlabeled)
- **Adult: PO/IM** (lactate) 5 mg at onset, may repeat once

Available forms: Tabs 0.5, 1, 2, 5, 10, 20 mg; *lactate:* oral sol 2 mg/ml; inj 5 mg/ml, *decanoate:* 50 mg/ml, 100 mg/ml

Administer:
- Reduced dose to geriatric patients
- Antiparkinsonian agent if EPS occurs
- Avoid use with CNS depressants

PO route
- **Oral liquid:** use calibrated device; do not mix in coffee or tea
- PO with food or milk

• Avoid skin contact with oral suspension or solution—may cause contact dermatitis

IM route

• IM inj into large muscle mass, use 21G, 2-in needle; give no more than 3 ml/inj site; patient should remain recumbent for 30 min

IV route (lactate)

• Give undiluted for psychotic episode at 5 mg/min

• Only use lactate for IV

Intermittent IV INF route

• Dilute in 30-50 ml of D_5W, give over 30 min

Y-site compatibilities: Amifostine, amsacrine, cisatracurium, cladribine, DOXOrubicin liposome, filgrastim, fludarabine, granisetron, LORazepam, melphalan, milrinone, PACLitaxel, palonosetron, pamidronate, pancuronium, propofol, remifentanil, riTUXimab, rocuronium, tacrolimus, teniposide, thiotepa, tigecycline, tirofiban, TPN, trastuzumab, vecuronium, vinCRIStine, vinorelbine, voriconazole, zoledronic acid

SIDE EFFECTS

CNS: *EPS: pseudoparkinsonism, akathisia, dystonia, tardive dyskinesia, drowsiness, headache,* seizures, neuroleptic malignant syndrome, confusion

CV: *Orthostatic hypotension,* hypertension, cardiac arrest, ECG changes, tachycardia, QT prolongation, sudden death, torsades de pointes

EENT: Blurred vision, glaucoma, dry eyes

GI: *Dry mouth, nausea, vomiting, anorexia, constipation,* diarrhea, jaundice, weight gain, ileus, hepatitis

GU: Urinary retention, dysuria, urinary frequency, enuresis, impotence, amenorrhea, gynecomastia

INTEG: *Rash,* photosensitivity, dermatitis

RESP: Laryngospasm, dyspnea, respiratory depression

SYST: Risk for death (dementia)

PHARMACOKINETICS

Metabolized by liver; excreted in urine, bile; crosses placenta; enters breast milk; protein binding 92%; terminal half-life 12-36 hr (metabolites)

PO: Onset erratic, peak 2-6 hr, half-life 24 hr

IM: Onset 15-30 min, peak 15-20 min, half-life 21 hr

IM (Decanoate): Peak 4-11 days, half-life 3 wk

INTERACTIONS

Increase: serotonin syndrome, neuroleptic malignant syndrome—SSRIs, SNRIs

Increase: QT prolongation—class IA, III antidysrhythmics, tricyclics, amoxapine, maprotiline, phenothiazines, pimozide, risperiDONE, sertindole, ziprasidone, β-blockers, chloroquine, cloZAPine, dasatinib, dolasetron, droperidol, dronedarone, flecainide, halogenated/local anesthetics, lapatinib, methadone, erythromycin, telithromycin, troleandomycin, octreotide, ondansetron, palonosetron, pentamidine, propafenone, ranolazine, SUNItinib, tacrolimus, vardenafil, vorinostat, usually with IV use

Increase: oversedation—other CNS depressants, alcohol, barbiturate anesthetics

Increase: toxicity—EPINEPHrine, lithium

Increase: both drugs effects—β-adrenergic blockers, alcohol

Increase: anticholinergic effects—anticholinergics

Decrease: effects—lithium, levodopa

Decrease: haloperidol effects—PHENobarbital, carBAMazepine

Drug/Lab Test

Increase: LFTs

NURSING CONSIDERATIONS

Assess:

• Prolactin, CBC, urinalysis, ophthalmic exam before and during prolonged therapy

Black Box Warning: Dementia, affect, orientation, LOC, reflexes, gait, coordination, sleep pattern disturbances, risk for death in dementia-related psychosis

- B/P standing, lying; take pulse, respirations q4hr during initial treatment; establish baseline before starting treatment; report drops of 30 mm Hg
- Dizziness, faintness, palpitations, tachycardia on rising
- **EPS** including akathisia (inability to sit still, no pattern to movements), tardive dyskinesia (bizarre movements of jaw, mouth, tongue, extremities), pseudoparkinsonism (rigidity, tremors, pill rolling, shuffling gait)
- **Neuroleptic malignant syndrome/serotonin syndrome:** hyperthermia, muscle rigidity, altered mental status, increased CPK, seizures, hypo/hypertension, tachycardia; notify prescriber immediately
- Constipation, urinary retention daily; if these occur, increase bulk, water in diet
- **Abrupt discontinuation:** do not withdraw abruptly, taper
- **QT prolongation:** more common with IV use at high doses; monitor ECG in those with CV disease

Perform/provide:

- Supervised ambulation until patient stabilized on medication; do not involve patient in strenuous exercise program, fainting is possible; patient should not stand still for long periods
- Sips of water, sugarless candy, gum for dry mouth
- Storage in tight, light-resistant container

Evaluate:

- Therapeutic response: decrease in emotional excitement, hallucinations, delusions, paranoia, reorganization of patterns of thought, speech; improvement in specific behaviors

Teach patient/family:

- That orthostatic hypotension occurs often; to rise from sitting or lying position gradually; to remain lying down after IM inj for at least 30 min
- To avoid hazardous activities until stabilized on medication and effects are known
- To avoid abrupt withdrawal of this product because EPS may result; to withdraw slowly
- To avoid OTC preparations (cough, hay fever, cold) unless approved by prescriber, serious product interactions may occur; to avoid use with alcohol, increased drowsiness may occur
- About EPS and necessity of meticulous oral hygiene because oral candidiasis may occur
- To report impaired vision, jaundice, tremors, muscle twitching

TREATMENT OF OVERDOSE: Activated charcoal, lavage if orally ingested; provide an airway; do not induce vomiting

HIGH ALERT

heparin (Rx)

(hep′a-rin)

Hepalean ♣, Heparin Leo ♣, Hep-Lock, Hep-Lock U/P, Monoject Prefill

Func. class.: Anticoagulant, antithrombotic

Do not confuse:
heparin/Hespan

ACTION: Prevents conversion of fibrinogen to fibrin and prothrombin to thrombin by enhancing inhibitory effects of antithrombin III

USES: Prevention of deep venous thrombosis, PE, MI, open heart surgery, disseminated intravascular clotting syndrome, atrial fibrillation with embolization, as an anticoagulant in transfusion and dialysis procedures, prevention of DVT/PE, to maintain patency of indwelling venipuncture devices; diagnosis, treatment of DIC

CONTRAINDICATIONS: Hypersensitivity, hemophilia, leukemia with bleeding, peptic ulcer disease, severe thrombocytopenic purpura, severe renal/hepatic disease, blood dyscrasias, severe hypertension, subacute bacterial endocarditis, acute nephritis; benzyl alcohol products in neonates/infants/pregnancy/lactation

Precautions: Pregnancy (C), children, geriatric patients, alcoholism, hyperlipidemia, diabetes, renal disease

DOSAGE AND ROUTES

Deep venous thrombosis/pulmonary embolism

- **Adult: IV BOL** 80 international units/kg then maintenance **IV INF** 18 international units/kg/hr; if aPTT <35 (1.2× normal), increase **IV INF** rate by 4 international units/kg/hr and rebolus with 80 international units/kg; if aPTT 35-45 (1.2-1.5× normal), increase **IV INF** by 2 international units/kg/hr and rebolus with 40 international units/kg; if aPTT 46-70 (1.5-2.3× normal), maintain **IV INF**; if aPTT 71-90 (2.3-3× normal), decrease **IV INF** by 2 international units/kg/hr; if aPTT >90 (>3× normal), hold **IV INF** for 1 hr then decrease rate 3 international units/kg/hr
- **Child/infant/neonate: IV** loading dose 75 international units/kg
- **Child >1 yr:** 20 international units/kg/hr
- **Infant/neonate <1 yr:** 28 international units/kg/hr as initial maintenance dose

Thrombosis prophylaxis (open heart/CV surgery)

- **Adult: IV** ≥150 international units/kg; procedures <60 min, up to 300 international units/kg; procedures >60 min, up to 400 international units/kg based on ACT

Thrombosis prophylaxis (PCI, not receiving abciximab)

- **Adult: IV BOL** weight adjusted with 60-100 international units/kg, maintain ACT within 250-300 sec (HemoTec) or 300-350 sec (Hemochron)
- **Child/infant/neonate: IV BOL** 100-150 international units/kg

Prophylaxis for DVT/PE

- **Adult: SUBCUT** 5000 units q8-12hr

IV catheter occlusion prophylaxis

- **Adult/child: IV** 10-100 units/ml
- **Infant <10 kg: IV** 10 units/ml

Available forms: Sol for inj 10, 100, 1000, 5000, 7500, 10,000, 20,000, 40,000 units/ml; premixed 1000 units/500 ml, 2000 units/1000 ml, 12,500 units/250 ml, 25,000 units/250 ml, 25,000 units/500 ml; lock flush preparations 10 units/ml

Administer:

- Cannot be used interchangeably (unit for unit) with LMWHs or heparinoids
- At same time each day to maintain steady blood levels

Heparin Lock route

⚠ Do not mistake heparin sodium inj 10,000 units/ml and Hep-Lock U/P 10 units/ml; they have similar blue labeling; deaths in pediatric patients have occurred when heparin sodium inj vials were confused with heparin flush vials

SUBCUT route

- **Give** deeply with 25G 5/8-1/2-in needle; do not massage area or aspirate when giving SUBCUT inj; give in abdomen between pelvic bones, rotate sites; do not pull back on plunger; leave in for 10 sec; apply gentle pressure for 1 min
- Changing needles is not recommended
- Avoid all IM inj that may cause bleeding, hematoma

Direct IV route

- Give loading dose undiluted, over ≥1 min, use before continuous inf

Continuous IV INF route

- Dilute 25,000 units/250-500 ml 0.9 NaCl or D_5W, (50-100 units) solutions are premixed and ready for use
- When product is added to inf sol for cont IV, invert container at least 6 times to ensure adequate mixing

Additive compatibilities: Avoid adding to sol, even if compatible; rate of heparin inf times may need to be changed

Y-site compatibilities: Acyclovir, allopurinol, amifostine, aminophylline, atropine, aztreonam, betamethasone, bleomycin, calcium gluconate, ceFAZolin, cefoTEtan, cefTAZidime, cefTRIAXone, chlordiazepoxide, cimetidine, CISplatin, cladribine, clindamycin, conjugated estrogens, cyanocobalamin, cyclophosphamide, cytarabine, dexamethasone, digoxin, DOPamine, DOXOrubicin liposome, edrophonium, enalaprilat, EPINEPHrine, esmolol, ethacrynate, etoposide, famotidine, fentaNYL, fluconazole, fludarabine, fluorouracil, foscarnet, furosemide, gallium, gemcitabine, granisetron, hydrocortisone, HYDROmorphone, insulin (regular), isoproterenol, kanamycin, leucovorin, linezolid, lidocaine, LORazepam, magnesium sulfate, melphalan, menadiol, meropenem, methotrexate, methoxamine, methyldopate, methylergonovine, metoclopramide, metroNIDAZOLE, midazolam, milrinone, minocycline, mitoMYcin, morphine, nafcillin, neostigmine, nitroglycerin, nitroprusside, norepinephrine, ondansetron, oxacillin, oxytocin, PACLitaxel, pancuronium, penicillin G potassium, phytonadione, piperacillin, piperacillin/tazobactam, potassium chloride, prednisoLONE, procainamide, propofol, propranolol, pyridostigmine, ranitidine, remifentanil, sargramostim, scopolamine, sodium bicarbonate, succinylcholine, tacrolimus, theophylline, thiopental, thiotepa, ticarcillin, ticarcillin/clavulanate, tirofiban, trimethobenzamide, trimethaphan, vecuronium, vinBLAStine, warfarin, zidovudine, zoledronic acid

SIDE EFFECTS

CNS: *Fever,* chills, headache

GU: Hematuria

HEMA: Hemorrhage, thrombocytopenia, anemia

INTEG: *Rash,* dermatitis, urticaria, pruritus, delayed transient alopecia, hematoma, cutaneous necrosis (SUBCUT), inj site reactions

META: Hyperkalemia, hypoaldosteronism

SYST: Anaphylaxis

PHARMACOKINETICS

Half-life 1½ hr; excreted in urine; 95% bound to plasma proteins; does not cross placenta or alter breast milk; removed from the system via the lymph and spleen; partially metabolized in kidney, liver; excreted in urine (<50% unchanged)

SUBCUT: Onset 20-60 min, duration 8-12 hr, well absorbed >35,000 international units/24 hr

IV: Peak 5 min, duration 2-6 hr

INTERACTIONS

Increase: heparin action—oral anticoagulants, salicylates, dextran, NSAIDs, platelet inhibitors, cephalosporins, penicillins, ticlopidine, dipyridamole, antineoplastics, clopidogrel, presgrel, SSRIs, SNRIs

Decrease: heparin action—digoxin, tetracyclines, antihistamines, cardiac glycosides, nicotine, nitroglycerin

Drug/Herb

Increase: bleeding risk—garlic, ginger, ginkgo, feverfew, green tea, horse chestnut

Drug/Lab Test

Increase: ALT, AST, INR, PT, PTT, potassium

Decrease: platelets

NURSING CONSIDERATIONS

Assess:

⚠ Bleeding, hemorrhage: gums, petechiae, ecchymosis, black tarry stools, hematuria, epistaxis, decrease in Hct, B/P; HIT may occur after product discontinuation

- Blood studies (Hct, occult blood in stools) q3mo
- Partial prothrombin time, which should be 1.5-2.5× control; for continuous IV inf, check aPTT baseline 6 hr after initiation and 6 hr after any dose change;

use aPTT for dosing adjustments; after therapeutic aPTT has been measured 2×, check aPTT daily
• Platelet count q2-3days; thrombocytopenia may occur on 4th day of treatment
• **Hypersensitivity:** rash, chills, fever, itching; report to prescriber

Perform/provide:
• Storage at room temp

Evaluate:
• Therapeutic response: decrease of DVT, adequate anticoagulation based on aPTT

Teach patient/family:
• To avoid OTC preparations that may cause serious product interactions unless directed by prescriber
• That product may be held during active bleeding (menstruation), depending on condition
• To use soft-bristle toothbrush to avoid bleeding gums; to avoid contact sports; to use an electric razor, to avoid IM inj
• To carry emergency ID identifying product taken
• To report to prescriber any signs of bleeding: gums, under skin, urine, stools
• To report to prescriber any signs of hypersensitivity: rash, chills, fever, itching

TREATMENT OF OVERDOSE:
Withdraw product, protamine 1 mg protamine/100 units heparin

hepatitis B immune globulin (HBIG) (Rx)
HepaGam B, Hyper HEP B S/D, Nabi-HB
Func. class.: Immune globulin

ACTION: Provides passive immunity to hepatitis B

USES: Prevention of hepatitis B virus in exposed patients, including passive immunity in neonates born to HBsAg-positive mother, prevention of hepatitis B recurrence after liver transplant in HBsAg-positive patients

CONTRAINDICATIONS: Hypersensitivity to immune globulins, coagulation disorders

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, hemophilia, active infection, IgA deficiency

DOSAGE AND ROUTES

Hepatitis B exposure in those at high risk
• **Adult and child: IM** 0.06 ml/kg (usual 3-5 ml) within 7 days of exposure; repeat 28 days after exposure if patient wishes to not receive hepatitis B vaccine

Neonates born to hepatitis B surface-antigen–positive persons
• **Neonate: IM** 0.5 ml within 12 hr of birth

Prevention of hepatitis B infection recurrence after liver transplant
• **Adult: IV** (HepaGam B only) 20,000 international units concurrent with grafting transplanted liver, then 20,000 international units/day on days 1-7, then 20,000 international units q2wk starting on day 14, then 20,000 international units/mo starting with mo 4

Available forms: Inj 1-, 4-, 5-ml vials; neonatal syringe 0.5 ml; HepaGam B sol for inj 312 units/ml; Hyper HEP B S/D 217 units/ml

Administer:
IM route
• After rotating vial; do not shake
• Only with EPINEPHrine 1:1000 on unit to treat laryngospasm
• In deltoid for better absorption (adult)

IV route (HepaGam B only)
• Calculate volume needed for each 20,000 international-unit dose using measured potency of each lot; HBIG potency stamped on label
• Promptly use after vial entered; discard unused product
• Give at 2 ml/min through separate IV line, use inf pump, decrease to 1 ml/min if inf-related event occurs, patient becomes uncomfortable
• Do not use HyperHEP B BS/D or Nabi-HB IV

SIDE EFFECTS

CNS: Headache, dizziness, fever
GI: Nausea, vomiting
INTEG: Soreness at inj site, urticaria, erythema, swelling
SYST: Induration, anaphylaxis, angioedema

INTERACTIONS

• Do not use within 3 mo of hepatitis B immune globulin, MMR, varicella, or rotavirus vaccines even after discontinuing product

NURSING CONSIDERATIONS

Assess:
• History of allergies, skin conditions (eczema, psoriasis, dermatitis), reactions to vaccinations
• Skin reactions: rash, induration, urticaria
⚠ **Anaphylaxis:** inability to breathe, bronchospasm, hypotension, wheezing, diaphoresis, fever, flushing
• Can be used with hepatitis B vaccine in cases of direct contact
Perform/provide:
• Written record of immunization
Evaluate:
• Prevention of hepatitis B
Teach patient/family:
• That discomfort may occur at site
• To report any rash, wheezing, inability to breathe immediately

homatropine ophthalmic

See Appendix B

hydrALAZINE (Rx)

(hye-dral'a-zeen)
Apresoline ♣
Func. class.: Antihypertensive, direct-acting peripheral vasodilator
Chem. class.: Phthalazine

Do not confuse:
hydrALAZINE/hydrOXYzine
Apresoline/allopurinol

ACTION: Vasodilates arteriolar smooth muscle by direct relaxation; reduction in blood pressure with reflex increases in heart rate, stroke volume, cardiac output

USES: Essential hypertension; severe essential hypertension
Unlabeled uses: CHF

CONTRAINDICATIONS: Hypersensitivity to hydrALAZINEs, mitral valvular rheumatic heart disease, CAD
Precautions: Pregnancy (C), breastfeeding, geriatric patients, CVA, advanced renal disease, hepatic disease, SLE, dissecting aortic aneurysm

DOSAGE AND ROUTES

Hypertension
• **Adult: PO** 10 mg qid 2-4 days, then 25 mg for rest of 1st wk, then 50 mg qid individualized to desired response, max 300 mg/day
• **Child: PO** 0.75-1 mg/kg/day in 2-4 divided doses, max 25 mg/dose, increase over 3-4 wk to max 7.5 mg/kg/day or 200 mg, whichever is less
Hypertensive crisis
• **Adult: IV BOL** 10-20 mg q4-6hr, administer **PO** as soon as possible; **IM** 10-50 mg q4-6hr
• **Child: IV BOL** 0.1-0.6 mg/kg q4hr; **IM** 0.1-0.6 mg/kg q4-6hr, max 1.7-3.5 mg/kg/day
CHF
• **Adult: PO** 10-25 mg tid, max 75 mg tid

Available forms: Inj 20 mg/ml; tabs 10, 25, 50, 100 mg

Administer:

PO route

- Give with meals (PO) to enhance absorption

IM route

- Do not admix, switch to PO as soon as possible
- No dilution needed, inject deeply in large muscle, aspirate

Direct IV route

- IV undiluted; give through Y-tube or 3-way stopcock, give each 10 mg over ≥1 min
- To recumbent patient, keep recumbent for 1 hr after administration

Y-site compatibilities: Alemtuzumab, anidulafungin, argatroban, atenolol, bivalirudin, bleomycin, DACTINomycin, DAPTOmycin, dexrazoxone, diltiazem, DOCEtaxel, etoposide, fludarabine, gatifloxacin, gemcitabine, granisetron, HYDROmorphone, IDArubicin, irinotecan, leucovorin, linezolid, mechlorethamine, metroNIDAZOLE, milrinone, mitoXANtrone, octreotide, oxaliplatin, PACLitaxel, palonosetron, pancuronium, potassium chloride, tacrolimus, teniposide, thiotepa, tirofiban, vecuronium, vinorelbine, vitamin B/C, voriconazole

Solution compatibilities: D_5LR, D_5W, $D_{10}W$, $D_{10}LR$, 0.45% NaCl, 0.9% NaCl, Ringer's, LR

SIDE EFFECTS

CNS: *Headache, tremors, dizziness, anxiety,* peripheral neuritis, depression, fever, chills

CV: *Palpitations, reflex tachycardia, angina,* shock, rebound hypertension, orthostatic hypotension

GI: *Nausea, vomiting, anorexia, diarrhea,* constipation, paralytic ileus

GU: Urinary retention, glomerulonephritis, hematuria

HEMA: Leukopenia, agranulocytosis, anemia, thrombocytopenia

INTEG: Rash, pruritus, urticaria

MISC: Nasal congestion, muscle cramps, *lupuslike symptoms,* flushing, edema, dyspnea

PHARMACOKINETICS

Half-life 3-7 hr, metabolized by liver, 12%-14% excreted in urine, protein binding 89%

PO: Onset 20-30 min, peak 1-2 hr, duration 2-4 hr

IM: Onset 10-30 min, peak 1 hr, duration 2-6 hr

IV: Onset 5-30 min, peak 10-80 min, duration 2-6 hr

INTERACTIONS

Increase: severe hypotension—MAOIs

Increase: tachycardia, angina—sympathomimetics (EPINEPHrine, norepinephrine)

Increase: hypotension—other antihypertensives, alcohol, levodopa, thiazide diuretics

Increase: effects of β-blockers

Decrease: hydrALAZINE effects—NSAIDs, estrogens

Drug/Lab Test

Decrease: Hgb, WBC, RBC, platelets, neutrophils

Positive: ANA titer

NURSING CONSIDERATIONS

Assess:

- Cardiac status: B/P q5min × 2 hr, then q1hr × 2 hr, then q4hr; pulse, jugular venous distention q4hr
- Electrolytes, blood studies: potassium, sodium, chloride, carbon dioxide, CBC, serum glucose, LE prep, ANA titer before, during treatment; assess for fever, joint pain, rash, sore throat (lupuslike symptoms); notify prescriber
- Weight daily, I&O
- Edema in feet, legs daily, skin turgor, dryness of mucous membranes for hydration status
- Crackles, dyspnea, orthopnea
- IV site for extravasation, rate
- Mental status: affect, mood, behavior, anxiety; check for personality changes

Evaluate:
- Therapeutic response: decreased B/P

Teach patient/family:
- To take with food to increase bioavailability (PO)
- To avoid OTC preparations unless directed by prescriber
- To notify prescriber if chest pain, severe fatigue, fever, muscle or joint pain occurs
- To rise slowly to prevent orthostatic hypotension
- To notify prescriber if pregnancy is suspected

TREATMENT OF OVERDOSE:
Administer vasopressors, volume expanders for shock; if PO, lavage or give activated charcoal, digitalization

hydrochlorothiazide (Rx)
(hye-droe-klor-oh-thye'a-zide)

Apo-Hydro ♣, Ezide, Neo-Codema ♣

Func. class.: Thiazide diuretic, antihypertensive

Chem. class.: Sulfonamide derivative

ACTION:
Acts on distal tubule and ascending limb of loop of Henle by increasing excretion of water, sodium, chloride, potassium

USES:
Edema, hypertension, diuresis, CHF; edema in corticosteroid, estrogen, NSAIDs; idiopathic lower extremity edema therapy

Unlabeled uses: Diabetes insipidus, hypercalciuria, nephrolithiasis, premenstrual syndrome, renal calculus

CONTRAINDICATIONS:
Hypersensitivity to thiazides or sulfonamides, anuria, renal decompensation, hypomagnesemia

Precautions: Pregnancy (B), breastfeeding, hypokalemia, renal/hepatic disease, gout, COPD, LE, diabetes mellitus, hyperlipidemia, CCr <30 ml/min

DOSAGE AND ROUTES
- **Adult/adolescent: PO** 12.5-25 mg/day, may increase to 50 mg/day in 1-2 divided doses
- **Child >6 mo: PO** 1-2 mg/kg/day in divided doses, max 37.5 mg for 6 mo-2 yr; max 100 mg/day for 2-12 yr
- **Child <6 mo: PO** up to 2-3.3 mg/kg/day in divided doses

Available forms: Tabs 12.5, 25, 50 mg; caps 12.5 mg

Administer:

PO route
- In AM to avoid interference with sleep if using product as a diuretic; tab may be crushed, mixed with food
- Potassium replacement if potassium <3 mg/dl
- With food; if nausea occurs, absorption may be decreased slightly

SIDE EFFECTS
CNS: Drowsiness, paresthesia, depression, headache, *dizziness, fatigue, weakness,* fever

CV: Irregular pulse, orthostatic hypotension, palpitations, volume depletion, allergic myocarditis

EENT: Blurred vision

ELECT: *Hypokalemia,* hypercalcemia, hyponatremia, hypochloremia, hypomagnesemia

GI: *Nausea, vomiting, anorexia,* constipation, diarrhea, cramps, pancreatitis, GI irritation, hepatitis

GU: *Urinary frequency,* polyuria, uremia, glucosuria, hyperuricemia

HEMA: Aplastic anemia, hemolytic anemia, leukopenia, agranulocytosis, thrombocytopenia, neutropenia

INTEG: *Rash,* urticaria, purpura, photosensitivity, alopecia, erythema multiforme

META: *Hyperglycemia, hyperuricemia,* increased creatinine, BUN

PHARMACOKINETICS
PO: Onset 2 hr, peak 4 hr, duration 6-12 hr, half-life 6-15 hr, excreted unchanged by kidneys, crosses placenta, enters breast milk

INTERACTIONS

Increase: hyperglycemia, hyperuricemia, hypotension—diazoxide
Increase: hypokalemia—glucocorticoids, amphotericin B
Increase: toxicity—lithium, non-depolarizing skeletal muscle relaxants, cardiac glycosides
Increase: renal failure risk—NSAIDs
Increase: effects—loop diuretics
Decrease: antidiabetics effects
Decrease: thiazides absorption—cholestyramine, colestipol

Drug/Lab Test
Increase: parathyroid test, uric acid, calcium, glucose, cholesterol, triglycerides
Decrease: potassium, sodium, Hgb, WBC, platelets

NURSING CONSIDERATIONS

Assess:
• Weight, I&O daily to determine fluid loss; effect of product may be decreased if used daily
• Rate, depth, rhythm of respiration, effect of exertion
• B/P lying, standing; postural hypotension may occur
• Blood studies: BUN, blood glucose, CBC, serum creatinine, blood pH, ABGs, uric acid, electrolytes
• **Signs of metabolic alkalosis:** drowsiness, restlessness
• **Signs of hypokalemia:** postural hypotension, malaise, fatigue, tachycardia, leg cramps, weakness, dehydration
• Confusion, especially in geriatric patients; take safety precautions if needed

Evaluate:
• Therapeutic response: improvement in edema of feet, legs, sacral area daily, decreased B/P

Teach patient/family:
• To increase fluid intake to 2-3 L/day unless contraindicated; to rise slowly from lying or sitting position
• To notify prescriber of muscle weakness, cramps, nausea, dizziness; hypokalemia is common
• That product may be taken with food or milk
• To use sunscreen for photosensitivity
• That blood glucose may be increased in diabetics
• To take early in day to avoid nocturia
• To avoid alcohol, OTC meds unless approved by prescriber
• To rise slowly to prevent dizziness

TREATMENT OF OVERDOSE:

Lavage if taken orally; monitor electrolytes; administer dextrose in saline; monitor hydration, CV, renal status

H

HYDROcodone (Rx)

(hye-droe-koe'done)
Hycodan ♣, Tussigon

HYDROcodone/ acetaminophen (Rx)

Co-Gesic, Dolorex Forte, Duocet, Hycet, Lorcet, Lortab, Margesic H, Liquicet, Maxidone, Norco, Polygesic, Stagesic, Vanacet, Vicodin, Vicodin ES, Vicodin HP, Xodol, Zamicet, Zydone

HYDROcodone/ ibuprofen (Rx)

Ibudone, Reprexain, Vicoprofen

Func. class.: Antitussive opioid analgesic/nonopioid analgesic

Controlled Substance Schedule III

Do not confuse:
HYDROcodone/hydrocortisone
Hycodan/Vicodin

ACTION: Acts directly on cough center in medulla to suppress cough; binds to opiate receptors in CNS to reduce pain

USES: Hyperactive and nonproductive cough, mild to moderate pain

CONTRAINDICATIONS:

Acne rosacea/vulgaris, Cushing's syndrome, measles, perioral dermatitis, varicella, abrupt discontinuation; hypersensitivity to this product, benzyl

Precautions: Pregnancy (C), breastfeeding, neonates, addictive personality, increased intracranial pressure, MI (acute), severe heart disease, respiratory depression, renal/hepatic disease, bowel impaction, urinary retention, viral infection, ulcerative colitis, seizures, sulfite hypersensitivity, psychosis, hypertension, hyperthyroidism

DOSAGE AND ROUTES

Analgesic

• **Adult: PO** 2.5-10 mg q3-6hr prn, max 60 mg/day

Antitussive

• **Adult: PO** 5 mg q4-6hr prn, max 30 mg/24 hr

Available forms: ***HYDROcodone:*** bulk powder; ***HYDROcodone/acetaminophen:*** 5 mg HYDROcodone/500 mg acetaminophen (Co-Gesic, Lorcet, Lortab 5/500, Stagesic, Vicodin); 7.5 mg HYDROcodone/400 mg acetaminophen (Zydone), 7.5 mg HYDROcodone/500 mg acetaminophen (Lortab 7.5/500), 7.5 mg HYDROcodone/750 mg acetaminophen (Vicodin ES), 5 mg HYDROcodone/325 acetaminophen, 10 mg HYDROcodone/325 acetaminophen (Norco), 10 mg HYDROcodone/500 mg acetaminophen (Lortab 10/500), 10 mg HYDROcodone/650 mg acetaminophen (Lorcet 10/650, Vicodin HP), 10 mg HYDROcodone/660 acetaminophen (Vicodin HP); caps 5 mg HYDROcodone/500 mg acetaminophen (Stagesic, Zydone); ***HYDROcodone/ibuprofen:*** tabs 7.5 mg HYDROcodone/200 mg ibuprofen (Vicoprofen)

Administer:

• Do not break, crush, or chew tabs; only scored tabs can be broken

• With antiemetic after meals if nausea or vomiting occurs

• Do not exceed 4 g acetaminophen with combination product

• Give with food or milk to prevent gastric upset

SIDE EFFECTS

CNS: *Drowsiness*, dizziness, light-headedness, confusion, headache, sedation, euphoria, dysphoria, weakness, hallucinations, disorientation, mood changes, dependence, seizures

CV: Palpitations, tachycardia, bradycardia, change in B/P, circulatory depression, syncope; cardiac arrest (children)

EENT: Tinnitus, blurred vision, miosis, diplopia

GI: *Nausea, vomiting, anorexia, constipation*, cramps, dry mouth, ulcers

GU: Increased urinary output, dysuria, urinary retention

INTEG: Rash, urticaria, flushing, pruritus

RESP: Respiratory depression; pulmonary edema, bronchopneumonia, respiratory arrest (children)

PHARMACOKINETICS

Onset 10-20 min, duration 4-6 hr, half-life 3½-4½ hr, metabolized in liver, excreted in urine, crosses placenta

INTERACTIONS

Increase: CNS depression—alcohol, opioids, sedative/hypnotics, phenothiazines, skeletal muscle relaxants, general anesthetics, tricyclics

Increase: severe reactions—MAOIs

Drug/Herb

Increase: CNS depression—lavender, valerian

Drug/Lab Test

Increase: amylase, lipase

NURSING CONSIDERATIONS

Assess:

• **Pain:** intensity, type, location, other characteristics before, 1 hr after giving product; titrate upward by 25% until pain reduced by half; need for pain medication, physical dependence, opioid is more effective before pain is severe

• **CNS changes:** dizziness, drowsiness, hallucinations, euphoria, LOC, pupil reaction
• B/P, pulse, respirations before, periodically; if respirations <10/min, dose may need to be reduced, oversedation may occur
• Bowel status: constipation; provide fluids, fiber in diet, may need stimulate laxatives
• **Allergic reactions:** rash, urticaria
• Cough and respiratory dysfunction: respiratory depression, character, rate, rhythm
• History of ulcers if using ibuprofen combination product

Perform/provide:
• Storage in light-resistant area at room temp
• Safety measures: night-light, call bell within easy reach; assistance with ambulation

Evaluate:
• Therapeutic response: decrease in pain or cough

Teach patient/family:
• To report any symptoms of CNS changes, allergic reactions
• That physical dependency may result when used for extended periods
• That withdrawal symptoms may occur: nausea, vomiting, cramps, fever, faintness, anorexia
• To avoid driving, other hazardous activities because drowsiness occurs
• To avoid other CNS depressants; they will enhance sedating properties of this product
• To change positions slowly to reduce orthostatic hypotension

TREATMENT OF OVERDOSE:

Naloxone HCl (Narcan) 0.2-0.8 mg IV, O_2, IV fluids, vasopressors

hydrocortisone (Rx)

(hy-dro-kor'tih-sone)

Cortef, Colocort, Cortenema

hydrocortisone acetate (Rx)

Anucort, Anusol, Cortifoam, Hemril, Proctocort, Rectasol

hydrocortisone sodium succinate (Rx)

A-hydroCort, Solu-Cortef

Func. class.: Corticosteroid

Chem. class.: Short-acting glucocorticoid

H

Do not confuse:
hydrocortisone/HYDROcodone

ACTION: Decreases inflammation by suppression of migration of polymorphonuclear leukocytes, fibroblasts, reversal of increased capillary permeability, and lysosomal stabilization

USES: Severe inflammation, adrenal insufficiency, ulcerative colitis, collagen disorders

Unlabeled uses: Carpal tunnel syndrome, Churg-Strauss syndrome, endophthalmitis, mixed connective-tissue disease, multiple myeloma, polyarteritis nodosa, polychondritis, pulmonary edema, temporal arteritis, Wegener's granulomatosis

CONTRAINDICATIONS: Fungal infection, hypersensitivity

Precautions: Pregnancy (C), breastfeeding, children <2 yr, diabetes mellitus, glaucoma, osteoporosis, seizure disorders, ulcerative colitis, CHF, myasthenia gravis, renal disease, esophagitis, peptic ulcer, metastatic carcinoma, psychosis, idiopathic thrombocytopenia (IM), acute glomerulonephritis, amebiasis, nonasthmatic bronchial disease, AIDS, TB, recent MI (associated with left ventricular rupture)

DOSAGE AND ROUTES

Adrenal insufficiency/inflammation

• **Adult: PO** 20-240 mg daily; **IM/IV** 100-500 mg (succinate)

Shock prevention

• **Adult: IM/IV** (succinate) 50 mg/kg repeated after 4 hr, repeat q24hr as needed

Colitis

• **Adult: PO** 20-240 mg (base)/day in 2-4 divided doses; **ENEMA** 100 mg nightly for 21 days

• **Child: PO** 2-8 mg (base)/kg/day or 60-240 mg (base)/m^2/day in 3-4 divided doses

Available forms: Tabs 5, 10, 20 mg; inj 25, 50 mg/ml; enema 100 mg/60 ml; **acetate:** inj 25 ♣, 50 mg/ml ♣, rectal 10% aerosol foam; supp 25, 30 mg; **succinate:** inj 100 mg, 250 mg, 500 mg, 1000 mg/vial

Administer:

• Daily dose in AM for better results

• In one dose in AM to prevent adrenal suppression; avoid SUBCUT administration, may damage tissue

• Do not use acetate or susp for IV

PO route

• With food or milk for GI symptoms

Rectal route

• Tell patient to retain for 1 hr if possible

IM route

• IM inj deep in large muscle mass; rotate sites; avoid deltoid; use 21G needle

IV route

• **Succinate:** IV in mix-o-vial or reconstitute ≤250 mg/2 ml bacteriostatic water for inj; mix gently; give direct IV over ≥1 min; may be further diluted in 100, 250, 500, or 1000 ml of D_5W, D_5 0.9%, NaCl 0.9% given over ordered rate

Sodium succinate preparations

Y-site compatibilities: Acyclovir, allopurinol, amifostine, aminophylline, amphotericin B cholesteryl, ampicillin, amrinone, amsacrine, atracurium, atropine, aztreonam, betamethasone, calcium gluconate, cefepime, cefmetazole, cephalothin, cephapirin, chlordiazepoxide, chlorproMAZINE, cisatracurium, cladribine, cyanocobalamin, cytarabine, dexamethasone, digoxin, diphenhydrAMINE, DOPamine, DOXOrubicin liposome, droperidol, edrophonium, enalaprilat, EPINEPHrine, esmolol, estrogens conjugated, ethacrynate, famotidine, fentaNYL, fentaNYL/droperidol, filgrastim, fludarabine, fluorouracil, foscarnet, furosemide, gallium, granisetron, heparin, hydrALAZINE, insulin (regular), isoproterenol, kanamycin, lidocaine, LORazepam, magnesium sulfate, melphalan, menadiol, meperidine, methicillin, methoxamine, methylergonovine, minocycline, morphine, neostigmine, norepinephrine, ondansetron, oxacillin, oxytocin, PACLitaxel, pancuronium, penicillin G potassium, pentazocine, phytonadione, piperacillin/tazobactam, prednisoLONE, procainamide, prochlorperazine, propofol, propranolol, pyridostigmine, remifentanil, scopolamine, sodium bicarbonate, succinylcholine, tacrolimus, teniposide, theophylline, thiotepa, trimethaphan, trimethobenzamide, vecuronium, vinorelbine

SIDE EFFECTS

CNS: *Depression, flushing, sweating,* headache, mood changes, pseudotumor cerebri

CV: *Hypertension,* circulatory collapse, thrombophlebitis, embolism, tachycardia, edema

EENT: Fungal infections, increased intraocular pressure, blurred vision

GI: *Diarrhea, nausea,* abdominal distention, GI hemorrhage, increased appetite, pancreatitis

HEMA: Thrombocytopenia

INTEG: Acne, poor wound healing, ecchymosis, petechiae

MS: Fractures, osteoporosis, weakness

PHARMACOKINETICS

Metabolized by liver, excreted in urine (17-OHCS, 17-KS), crosses placenta

PO: Peak 1-2 hr, duration 1-1½ days

IM/IV: Onset 20 min, peak 4-8 hr, duration 1-1½ days

RECT: Onset 3-5 days

INTERACTIONS

Increase: GI bleeding risk—salicylates, NSAIDs

Increase: side effects—alcohol, amphotericin B, digoxin, cycloSPORINE, diuretics

Decrease: hydrocortisone action—bosentan, cholestyramine, colestipol, barbiturates, rifampin, ePHEDrine, phenytoin, theophylline

Decrease: anticoagulant effects, anticonvulsants, antidiabetics, calcium supplements, toxoids, vaccines

Drug/Lab Test

Increase: cholesterol, sodium, blood glucose, uric acid, calcium, glucose

Decrease: calcium, potassium, T_4, T_3, thyroid ^{131}I uptake test, urine 17-OHCS, 17-KS

False negative: skin allergy tests

NURSING CONSIDERATIONS

Assess:

- Potassium, blood glucose, urine glucose while patient receiving long-term therapy; hypokalemia and hyperglycemia; potassium depletion: paresthesias, fatigue, nausea, vomiting, depression, polyuria, dysrhythmias, weakness
- B/P, pulse; notify prescriber of chest pain
- I&O ratio; be alert for decreasing urinary output, increasing edema; weight daily, notify prescriber of weekly gain >5 lb
- **Adrenal insufficiency (cushingoid symptoms):** nausea, anorexia, SOB, moon face, fatigue, dizziness, weakness, joint pain before and during treatment; plasma cortisol levels during long-term therapy (normal level: 138-635 nmol/L SI units when drawn at 8 AM)
- **Infection:** increased temp, WBC even after withdrawal of medication; product masks infection
- Mental status: affect, mood, behavioral changes, aggression
- **GI effects:** nausea, vomitting, anorexia or appetite stimulation, diarrhea, constipation, abdominal pain, hiccups, gastritis, pancreatitis, GI bleeding/perforation with long-term treatment

Perform/provide:

- Assistance with ambulation for patient with bone-tissue disease to prevent fractures

Evaluate:

- Therapeutic response: decreased inflammation, GI symptoms

Teach patient/family:

- That emergency ID as corticosteroid user should be carried
- To immediately report abdominal pain, black tarry stools because GI bleeding/perforation can occur
- To notify prescriber if therapeutic response decreases; that dosage adjustment may be needed; about signs of infection
- Not to discontinue abruptly because adrenal crisis can result; that product should be tapered
- That supplemental calcium/vit D may be needed if patient receiving long-term therapy
- That product can mask infection and cause hypoglycemia (diabetic)
- To avoid OTC products: salicylates, alcohol in cough products, cold preparations unless directed by prescriber
- About cushingoid symptoms of adrenal insufficiency: nausea, anorexia, fatigue, dizziness, dyspnea, weakness, joint pain, moon face
- To avoid live-virus vaccines if using steroids long term

hydrocortisone nasal
See Appendix B

hydrocortisone (topical)

(hye-droe-kor'ti-sone)

Ala-Cort, Ala-Scalp, Anusol HC, Cetacort, Cortizone-5, Cortizone-10, Cortizone-10 Quickshot, Dermolate, Hi-Cor 2.5, HydroSKIN, Hytone, LactiCare-HC, Maximum Strength Cortaid Faststick, Procort, Texacort

hydrocortisone acetate

Anusol HC, Cortaid, Cortef, Corticaine, ProctoCream-HC, ProctoFoam-HC, Tucks, U-cort

hydrocortisone butyrate

Locoid, Locoid Lipocream

hydrocortisone probutate

Pandel

hydrocortisone valerate

Func. class.: Corticosteroid, topical

ACTION: Crosses cell membrane to attach to receptors to decrease inflammation, itching, inhibits multiple inflammatory cytokines

USES: Inflammation/itching in corticosteroid-responsive dermatoses on the skin, rectal area

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (C), breastfeeding, children

DOSAGE AND ROUTES

Corticosteroid-responsive dermatoses, inflammation, pruritus

- **Adult/child: TOP** apply to affected area 1 to 4 times per day

Inflammation from proctitis

- **Adult: Rectal** 1 applicator full of foam once or twice a day × 2-3 wk, then every other day as needed; enema every night × 21 days or until improvement; may use every other night × 2-3 mo; suppository bid × 2 wk

Available forms:

Hydrocortisone: cream 0.5%, 1%, 2.5%; gel 1%, 2%; lotion 0.25%, 0.5%, 1%, 2%, 2.5%; ointment 0.5%, 1%, 2.5%; rectal cream 1%; rectal ointment 1%; spray 1%; roll-on stick 1%; solution 1%, 2.5%; **Hydrocortisone acetate:** cream 0.5%, 1%, 2%, 2.5%; lotion 0.5%; ointment 0.5%, 1%; rectal foam 90 mg/application; suppositories 25 mg, 30 mg; **Hydrocortisone butyrate:** cream 0.1%; ointment 0.1%; solution 0.1%; **Hydrocortisone probutate:** cream 0.1%; **Hydrocortisone valerate:** cream 0.2%, ointment 0.2%

Administer:

Topical route

- May be used with dressings

Cream/Ointment/Lotion

- Apply sparingly in a thin film and rub gently

Rectal

- Remove wrapper and insert suppository

SIDE EFFECTS

INTEG: Burning, folliculitis, pruritus, dermatitis, maceration

MISC: Hyperglycemia; glycosuria

PHARMACOKINETICS

Unknown

NURSING CONSIDERATIONS

Assess:

- Skin reactions: burning, pruritus, folliculitis, dermatitis

Evaluate:

- Decreasing itching, inflammation on the skin, rectal area

Teach patient/family:

Topical route

- That product may be used with dressings

Cream/Ointment/Lotion
- To apply sparingly in a thin film and rub gently into the affected area

Gel
- To apply sparingly in a thin film and rub gently

Rectal
- To remove wrapper and insert suppository

⚠ HIGH ALERT

HYDROmorphone (Rx)

(hye-droe-mor'fone)

Dilaudid, Dilaudid HP, Exalgo, Hydromorph Contin ✤

Func. class.: Opiate analgesic

Chem. class.: Semisynthetic phenanthrene

Controlled Substance Schedule II

Do not confuse:
HYDROmorphone/meperidine/morphine
Dilaudid/Demerol

ACTION: Inhibits ascending pain pathways in CNS, increases pain threshold, alters pain perception

USES: Moderate to severe pain, nonproductive cough

CONTRAINDICATIONS: Hypersensitivity

Black Box Warning: Respiratory depression, opioid-naive patients

Precautions: Pregnancy (C), breastfeeding, children <18 yr, addictive personality, increased intracranial pressure, MI (acute), severe heart disease, renal/hepatic disease, bowel impaction, abrupt discontinuation, COPD

Black Box Warning: Substance abuse, accidental exposure, potential for overdose/poisoning

DOSAGE AND ROUTES

Analgesic
- **Adult: PO** (oral solution) 2.5-10 mg q3-6hr or (tabs) 2-4 mg q4-6hr; **EXT REL** (Exalgo): convert to **EXT REL** by giving total daily dose of immediate release/day, in 1 daily dose, if needed titrate **EXT REL** q3-4days until adequate pain relief; use 25-50% increase for each titration step, if more than 2 doses of rescue medication needed in 24 hr consider titration; **SUBCUT/IV** 1-2 mg q4-6hr prn, may be increased (opioid-naive patients may require lower dose); **RECT** 3 mg q6-8hr prn
- **Geriatric: PO** 1-2 mg q4-6hr
- **Child >50 kg (unlabeled): PO** 2-4 mg q3-4hr in opioid-naive patients, titrate
- **Infant >6 mo/child <50 kg (unlabeled): PO** 0.04-0.08 mg/kg q3-4hr in opioid-naive patients, titrate

Hepatic disease
- **Adult: Child-Pugh B, or C** (oral liquid, immediate rel tab, supp) give reduced dose based on response, impairment (parental) give 25% to 50% of dose (moderate impairment)

Available forms: Inj 1, 2, 4, 10 mg/ml; tabs 2, 4, 8 mg; supp 3 mg; oral sol 5 mg/5 ml; ext rel tab 8, 12, 16 mg

Administer:

PO route
- Give with food or milk for GI irritation
- **Ext rel (Exalgo):** discontinue all other ext rel opioids, give q24hr; do not crush, break, chew
- When pain is beginning to return; determine interval by response

Black Box Warning: Do not use ext rel products in opioid-naive patients

Extended release
- **Converting from oral opioids:** conversion ratios are approximate; initiate ext rel tabs at 50% of calculated total daily equivalent dose of ext rel, give q24hr; max increase q3-4days, consider titration increases of 25-50% with each step
- **Converting from transdermal patch (fentanyl):** initiate ext rel tabs 18

hr after removal of patch; for each 25 mcg/hr dose of transdermal fentaNYL dose is 12 mg q24hr, start dose at 50% of calculated HYDROmorphone ext rel dose q24hr; titrate no more often than q3-4days, consider dose increases of 25-50% with each step; if more than 2 rescue doses are required in 24 hr, consider titration

SUBCUT route

- Use short 30G needle, make sure not to inject ID
- Rotate inj sites

IV route

- **Direct,** diluted with 5 ml sterile water or NS; give through Y-connector or 3-way stopcock; give ≤2 mg over 3-5 min
- **IV INF:** Dilute each 0.1-1 mg/ml NS (0.1-1 mg/ml), deliver by opioid syringe infusor; may be diluted in D_5W, D_5/NaCl, 0.45% NaCl, NS for larger amounts, delivery through inf pump

Additive compatibilities: Bupivacaine, cloNIDine, fluorouracil, heparin, midazolam, ondansetron, potassium chloride, promethazine, verapamil, ziconotide

Solution compatibilities: D_5W, D_5/0.45% NaCl, D_5/0.9% NaCl, D_5/LR, D_5/Ringer's sol, 0.45% NaCl, 0.9% NaCl, Ringer's and lactated Ringer's sol

Syringe compatibilities: Atropine, bupivacaine, cefTAZidime, chlorproMAZINE, cimetidine, dimenhyDRINATE, diphenhydrAMINE, fentaNYL, glycopyrrolate, hydrOXYzine, LORazepam, midazolam, pentazocine, promethazine, ranitidine, scopolamine, tetracaine, thiethylperazine, trimethobenzamide

Y-site compatibilities: Acyclovir, allopurinol, amifostine, amikacin, amsacrine, aztreonam, cefamandole, ceFAZolin, cefepime, cefmetazole, cefoperazone, cefotaxime, cefOXitin, cefTAZidime, ceftizoxime, cefuroxime, cephalothin, cephapirin, chloramphenicol, cisatracurium, CISplatin, cladribine, clindamycin, cyclophosphamide, cytarabine, diltiazem, DOBUTamine, DOPamine, DOXOrubicin, DOXOrubicin liposome, doxycycline, EPINEPHrine, erythromycin lactobionate, famotidine, fentaNYL, filgrastim, fludarabine, foscarnet, furosemide, gentamicin, granisetron, heparin, kanamycin, labetalol, LORazepam, magnesium sulfate, melphalan, methotrexate, metroNIDAZOLE, mezlocillin, midazolam, milrinone, morphine, moxalactam, nafcillin, niCARdipine, nitroglycerin, norepinephrine, ondansetron, oxacillin, PACLitaxel, penicillin G potassium, piperacillin, piperacillin/tazobactam, propofol, ranitidine, remifentanil, teniposide, thiotepa, ticarcillin, tobramycin, trimethoprim-sulfamethoxazole, vancomycin, vecuronium, vinorelbine

SIDE EFFECTS

CNS: *Drowsiness, dizziness, confusion, headache, sedation, euphoria,* mood changes, seizures

CV: Palpitations, bradycardia, change in B/P, hypotension, tachycardia, peripheral vasodilation

EENT: Tinnitus, blurred vision, miosis, diplopia

GI: *Nausea, vomiting, anorexia, constipation, cramps,* dry mouth, paralytic ileus

GU: Increased urinary output, dysuria, urinary retention

INTEG: *Rash,* urticaria, bruising, flushing, diaphoresis, pruritus

RESP: Respiratory depression, dyspnea

PHARMACOKINETICS

IM: Onset 15-30 min, peak ½-1 hr, duration 4-5 hr, metabolized by liver, excreted by kidneys, crosses placenta, excreted in breast milk, half-life 2-3 hr

INTERACTIONS

Increase: effects—other CNS depressants (alcohol, opiates, sedative/hypnotics, antipsychotics, skeletal muscle relaxants)

⚠ **Increase:** severe CNS, respiratory depression—MAOIs

Decrease: HYDROmorphone effects—opiate antagonists

Drug/Herb
Increase: action—chamomile, hops, kava, lavender, St. John's wort, valerian
Drug/Lab Test
Increase: amylase

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Respiratory dysfunction: respiratory depression, character, rate, rhythm; notify prescriber if respirations <10/min

- I&O ratio; check for decreasing output; may indicate urinary retention
- CNS changes: dizziness, drowsiness, hallucinations, euphoria, LOC, pupil reaction
- Bowel function, constipation
- Allergic reactions: rash, urticaria
- Need for pain medication, physical dependence
- **Pain:** control, sedation by scoring on 0-10 scale, ATC dosing is best for pain control

Perform/provide:

- Storage in light-resistant area at room temp
- Assistance with ambulation
- Safety measures: side rails, nightlight, call bell within easy reach

Evaluate:

- Therapeutic response: decrease in pain

Teach patient/family:

- To report any symptoms of CNS changes, allergic reactions
- That physical dependency may result when used for extended periods; that withdrawal symptoms may occur: nausea, vomiting, cramps, fever, faintness, anorexia
- To avoid driving, other hazardous activities because drowsiness occurs

TREATMENT OF OVERDOSE:

Naloxone (Narcan) 0.2-0.8 mg IV (nontolerant patients), O_2, IV fluids, vasopressors

hydroxychloroquine (Rx)

(hye-drox-ee-klor'oh-kwin)

Apo-Hydroxyquine ✤, Plaquenil

Func. class.: Antimalarial, antirheumatic (DMARDs)

Chem. class.: 4-Aminoquinoline derivative

ACTION: Impairs complement-dependent antigen–antibody reactions

USES: Malaria caused by susceptible strains of *Plasmodium vivax, P. malariae, P. ovale, P. falciparum* (some strains); SLE, rheumatoid arthritis
Unlabeled uses: SLE in children

CONTRAINDICATIONS: Hypersensitivity to this product or chloroquine; retinal field changes

Black Box Warning: Children (long term), ocular disease

Precautions: Pregnancy (C), breastfeeding, blood dyscrasias, severe GI disease, neurologic disease, alcoholism, hepatic disease, G6PD deficiency, psoriasis, eczema

DOSAGE AND ROUTES

Malaria

- **Adult: PO Suppression or prevention:** 400 mg/wk, begin 1-2 wk before travel, continue 4 wk after returning; **treatment:** 800 mg, then 400 mg after 6-8 hr, then 400 mg/day on 2nd and 3rd day, total dose 2 g
- **Child: PO Suppression or prevention:** 6.4 mg/kg (5 mg/kg base) weekly, begin 1-2 wk before travel, continue 4 wk after returning; **treatment:** 10 mg/kg, 6.4 mg/kg (5 mg/kg base) at 6, 18, 24 hr after 1st dose

Lupus erythematosus

- **Adult: PO** 400 mg (310 mg base) daily-bid; length depends on patient response; **maintenance** 200-400 mg/day

• **Child (unlabeled): PO** 5 mg/kg/day, max 400 mg/day; long-term therapy is contraindicated

Rheumatoid arthritis

• **Adult: PO** 400-600 mg/day for 4-12 wk then 200-300 mg/day after good response

Available forms: Tabs 200 mg

Administer:

PO route

• Tabs may be crushed and mixed with food, fluids

• With food or milk; at same time each day to maintain product level

• For malaria, prophylaxis should be started 2 wk before exposure, continued for 4-6 wk after leaving exposure area

SIDE EFFECTS

CNS: Headache, stimulation, fatigue, irritability, seizures, bad dreams, dizziness, confusion, psychosis, decreased reflexes

CV: Hypotension, heart block, asystole with syncope

EENT: *Blurred vision, corneal changes, retinal changes, difficulty focusing,* tinnitus, vertigo, deafness, photophobia, corneal edema

GI: *Nausea, vomiting, anorexia,* diarrhea, cramps

HEMA: Thrombocytopenia, agranulocytosis, leukopenia, aplastic anemia

INTEG: Pruritus, pigmentation changes, skin eruptions, lichen-planus–like eruptions, eczema, exfoliative dermatitis, alopecia, Stevens-Johnson syndrome, photosensitivity

PHARMACOKINETICS

Peak 3 hr; terminal half-life 32-50 days; metabolized in liver; excreted in urine, feces, breast milk; crosses placenta, protein binding 45%

INTERACTIONS

Increase: digoxin, methotrexate levels

Increase: antibody titer—rabies vaccine

Decrease: hydroxychloroquine action—magnesium or aluminum compounds

Decrease: effect of—live virus vaccines, botulinum toxoids

NURSING CONSIDERATIONS

Assess:

• **SLE, malaria symptoms:** before treatment and daily

• **Rheumatoid arthritis:** pain, swelling, ROM, temp of joints

• Ophthalmic exam at baseline and q6mo if long-term treatment or product dosage >150 mg/day

• Hepatic studies q wk: AST, ALT, bilirubin if patient receiving long-term treatment

• **Blood dyscrasias:** blood studies: CBC, platelets; WBC, RBC, platelets may be decreased; if severe, product should be discontinued; assess for malaise, fever, bruising, bleeding (rare)

• For decreased reflexes: knee, ankle

• **ECG** during therapy: watch for depression of T waves, widening of QRS complex

• **Allergic reactions:** pruritus, rash, urticaria

• **For ototoxicity** (tinnitus, vertigo, change in hearing); audiometric testing should be done before, after treatment

⚠ For toxicity: blurring vision, difficulty focusing, headache, dizziness, knee, ankle reflexes; product should be discontinued immediately

Perform/provide:

• Storage in tight, light-resistant container at room temp; keep inj in cool environment

Evaluate:

• Therapeutic response: decreased symptoms of malaria, SLE, rheumatoid arthritis

Teach patient/family:

• To use sunglasses in bright sunlight to decrease photophobia; to wear protective clothing (photosensitivity)

• That urine may turn rust or brown; that skin may become blue-black

• To report hearing, visual problems, fever, fatigue, bruising, bleeding, which may indicate blood dyscrasias

TREATMENT OF OVERDOSE:

Induce vomiting; gastric lavage; administer barbiturate (ultrashort acting), vasopressor, ammonium chloride; tracheostomy may be necessary

hydroxyurea (Rx)

(hye-drox'ee-yoo-ree-ah)

Droxia, Hydrea

Func. class.: Antineoplastic, antimetabolite

Chem. class.: Synthetic urea analog

Do not confuse:
hydroxyurea/hydrOXYzine

ACTION: Acts by inhibiting DNA synthesis without interfering with RNA or protein synthesis; incorporates thymidine into DNA, thereby causing direct damage to DNA strands; specific for S phase of cell cycle

USES: Melanoma, chronic myelogenous leukemia, recurrent or metastatic ovarian cancer, squamous cell carcinoma of the head and neck, sickle cell anemia

Unlabeled uses: Psoriasis, acute myelogenous leukemia (AML), astrocytoma, HIV, lung cancer, malignant glioma, polycythemia vera, thrombocytosis

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, hypersensitivity, leukopenia ($<2500/mm^3$), thrombocytopenia ($<100,000/mm^3$), anemia (severe)

Precautions: Renal disease (severe), anemia, bone marrow suppression, dental disease, geriatric patients, HIV, hyperkalemia, hyperphosphatemia, hyperuricemia, hypocalcemia, infection, infertility, IM injection, tumor lysis syndrome, vaccinations

Black Box Warning: Requires an experienced clinician, secondary malignancy

DOSAGE AND ROUTES

Ovarian cancer, malignant melanoma

- **Adult: PO** 80 mg/kg as a single dose q3days or 20-30 mg/kg as a single dose daily

Ovarian cancer in combination with radiation

- **Adult: PO** 80 mg/kg as a single dose q3days

Chronic myelogenous leukemia (CML)/acute myelogenous leukemia (unlabeled)

- **Adult: PO** WBC $>100,000/mm^3$, 50-75 mg/kg/day; WBC $<100,000/mm^3$, 10-30 mg/kg/day; adjust for WBCs
- **Child: PO** 10-20 mg/kg/day, adjust to hematologic response

Sickle cell anemia

- **Adult: PO** 15 mg/kg/day, may increase by 5 mg/kg/day q12wk, max 35 mg/kg/day

Renal disease

- **Adult:** CCr <59 ml/min use 50% of dose

Available forms: Caps 200, 300, 400, 500 mg

Administer:

- Gloves should be worn when handling bottles or caps, including by caregivers, wash hands immediately and thoroughly
- Do not crush or chew caps; caps can be opened and contents mixed with water
- Antiemetic 30-60 min before product and prn

SIDE EFFECTS

CNS: Headache, confusion, hallucinations, dizziness, seizures

CV: Angina, ischemia

GI: Nausea, vomiting, anorexia, diarrhea, stomatitis, constipation, hepatotoxicity, pancreatitis

GU: Increased BUN, uric acid, creatinine, temporary renal function impairment

HEMA: Leukopenia, anemia, thrombocytopenia, megaloblastic erythropoiesis

INTEG: *Rash,* urticaria, pruritus, dry skin, facial erythema

META: Hyperphosphatemia, hyperuricemia, hypocalcemia
MISC: Fever, chills, malaise, secondary cancers, tumor lysis syndrome
RESP: Pulmonary fibrosis, diffuse pulmonary infiltrates

PHARMACOKINETICS

Readily absorbed when taken orally; peak level in 1-4 hr; degraded in liver; excreted in urine, almost totally eliminated within 24 hr; readily crosses blood-brain barrier; eliminated as CO_2; terminal half-life 3.5-4.5 hr

INTERACTIONS

Increase: pancreatitis/hepatotoxicity—didanosine, stavudine
Increase: toxicity—radiation or other antineoplastics
Increase: bleeding risk—NSAIDs, anticoagulants, thrombolytics, salicylates, platelet inhibitors
Increase: uric acid levels—probenecid, sulfinpyrazone
• Do not use with live virus vaccines
• Do not use hematopoietic progenitor cells (sargramostim, filgrastim) 24 hr before or after antineoplastic

Drug/Lab Test
Increase: BUN, creatinine, LFTs, uric acid
False increase: urea, uric acid, lactic acid
Decrease: Hgb, WBC, platelets

NURSING CONSIDERATIONS

Assess:
• **Bone marrow suppression:** determine the hemoglobin concentration, total leukocyte count, and platelet count at least once a week during entire course; if the WBC is $\leq 2500/mm^3$ or platelets are $\leq 100{,}000/mm^3$, interrupt Hydrea until the values rise significantly toward normal concentrations; if severe anemia occurs, manage it without interrupting Hydrea receipt; for Droxia, monitor blood counts q2wk and interrupt drug receipt if neutrophils are $<2000/mm^3$, platelets are $<80{,}000/mm^3$, hemoglobin is <4.5 g/dl, or reticulocytes are $<80{,}000/mm^3$ when the hemoglobin concentration is <9 g/dl; after recovery, Droxia may be resumed at lower dosage; Droxia therapy requires an experienced clinician knowledgeable in the use of this medication for the treatment of sickle cell anemia
• Renal studies: BUN, serum uric acid, urine CCr, electrolytes before, during therapy
• **Tumor lysis syndrome;** hyperkalemia, hyperphosphatemia, hyperuricemia, hypocalcemia; uric acid nephropathy, acute renal failure, metabolic acidosis can also occur; aggressive alkalinization of urine, allopurinol can prevent this
• I&O ratio; report fall in urine output to <30 ml/hr
• Monitor temp; fever may indicate beginning infection
• Hepatic studies before, during therapy: bilirubin, alk phos, AST, ALT, LDH; prn or q mo
• **Cutaneous vasculitic toxicity and gangrene:** more common in those who are receiving interferon
• **Bleeding:** hematuria, guaiac, bruising or petechiae, mucosa or orifices q8hr
• Buccal cavity for dryness, sores or ulceration, white patches, oral pain, bleeding, dysphagia
• **Pulmonary reactions:** assess for pulmonary fibrosis, fever, dyspnea, diffuse pulmonary infiltrates
• **Symptoms indicating severe allergic reaction:** rash, urticaria, itching, flushing
• **Neurotoxicity:** headaches, hallucinations, seizures, dizziness

Perform/provide:
• Rinsing of mouth tid-qid with water, club soda; brushing of teeth bid-tid with soft brush or cotton-tipped applicators for stomatitis; use unwaxed dental floss

Evaluate:
• Therapeutic response: decreased tumor size, spread of malignancy

Teach patient/family:
• To report signs of infection: elevated temp, sore throat, flulike symptoms

- To report signs of anemia: fatigue, headache, faintness, SOB, irritability
- To report bleeding: to avoid use of razors, commercial mouthwash
- To avoid use of aspirin products, ibuprofen (thrombocytopenia)
- To avoid foods with citric acid, hot or rough texture if stomatitis is present
- To report stomatitis: any bleeding, white spots, ulcerations in the mouth; to examine mouth daily, report symptoms
- To notify prescriber if pregnancy is planned or suspected, pregnancy (D)
- To notify prescriber of fever, chills, sore throat, nausea, vomiting, anorexia, diarrhea, bleeding, bruising; may indicate blood dyscrasias; mental status changes

hydrOXYzine (Rx)

(hye-drox'i-zeen)

Vistaril

Func. class.: Antianxiety/antihistamine/sedative/hypnotic, antiemetic

Chem. class.: Piperazine derivative

Do not confuse:
hydrOXYzine/hydrALAZINE
Vistaril/Versed

ACTION: Depresses subcortical levels of CNS, including limbic system, reticular formation; competes with H_1-receptor sites

USES: Anxiety preoperatively, postoperatively to prevent nausea, vomiting; to potentiate opioid analgesics; sedation; pruritus, ethanol withdrawal
Unlabeled uses: Insomnia, allergic rhinitis, generalized anxiety disorder

CONTRAINDICATIONS: Pregnancy 1st trimester, breastfeeding; hypersensitivity to this product or cetirizine; acute asthma
Precautions: Pregnancy (C) (2nd/3rd trimester), geriatric patients, debilitated, renal/hepatic disease, closed-angle glaucoma, COPD, prostatic hypertrophy, asthma

DOSAGE AND ROUTES

Anxiety
- **Adult: PO** 50-100 mg qid, max 600 mg/day; **IM** 50-100 mg q4-6hr
- **Geriatric: PO** max 50 mg/day
- **Child >6 yr: PO** 50-100 mg/day in divided doses
- **Child <6 yr: PO** 50 mg/day in divided doses

Alcohol withdrawal
- **Adult: IM** 50-100 mg q4-6hr

Preoperatively/postoperatively (nausea/vomiting)
- **Adult: IM** 25-100 mg q4-6hr
- **Child: IM** 1.1 mg/kg as a single dose

Pruritus
- **Adult: PO** 25 mg tid-qid; **IM** 50-100 mg then q4-6hr prn, switch to **PO** as soon as feasible
- **Child ≥6 yr: PO** 50-100 mg/day in divided doses; **IM** 0.5-1 mg/kg/dose q4-6hr prn, use **PO** when possible
- **Child <6 yr: PO** 50 mg/day in divided doses

Insomnia (unlabeled)
- **Adult: PO** 50-100 mg 30-60 min before bedtime; **IM** 50 mg 30-60 min before bedtime

Renal dose
- **Adult: PO** CCr <50 ml/min, give 50% of dose

Available forms: Tabs 10, 25, 50 mg; caps 25, 50, 100 mg; oral sol 10 mg/ 5 ml; inj 25, 50 mg/ml; oral susp 25 mg/ 5 ml

Administer:

PO route
- Without regard to meals
- Crushed if patient is unable to swallow medication whole
- Shake oral susp before giving

IM route
- Does not need to be diluted; give by Z-track inj in large muscle to decrease pain, chance of necrosis, never give IV/SUBCUT (HCl)

Additive compatibilities: CISplatin, cyclophosphamide, cytarabine, dimenhyDRINATE, etoposide, lidocaine, mesna, methotrexate, nafcillin

Syringe compatibilities: Atropine, butorphanol, chlorproMAZINE, cimetidine, codeine, diphenhydrAMINE, doxapram, droperidol, fentaNYL, fluPHENAZine, glycopyrrolate, HYDROmorphone, lidocaine, meperidine, metoclopramide, midazolam, morphine, nalbuphine, oxymorphone, pentazocine, perphenazine, procaine, prochlorperazine, scopolamine, SUFentanil

SIDE EFFECTS

CNS: *Dizziness, drowsiness,* confusion, headache, tremors, fatigue, depression, seizures

CV: Hypotension

GI: Dry mouth, increased appetite, nausea, diarrhea, weight gain

PHARMACOKINETICS

PO: Onset 15-60 min, duration 4-6 hr, half-life 3 hr, metabolized by liver, excreted by kidneys

INTERACTIONS

Increase: CNS depressant effect—barbiturates, opioids, analgesics, alcohol, sedative/hypnotics, other CNS depressants

Increase: anticholinergic effects—phenothiazines, quiNIDine, disopyramide, antihistamines, antidepressants, atropine, haloperidol, MAOIs

Drug/Lab Test

False negative: skin allergy testing

False increase: 17-hydroxycorticosteroids

NURSING CONSIDERATIONS

Assess:

- Anticholinergic effects: dry mouth, dizziness, confusion, hypotension, increased sedation; monitor B/P

Perform/provide:

- Assistance with ambulation during beginning therapy, since drowsiness, dizziness occurs

Evaluate:

- Therapeutic response: decreased anxiety

Teach patient/family:

- To avoid OTC preparations (cold, cough, hay fever) unless approved by prescriber
- To avoid driving, activities that require alertness
- To avoid alcohol, psychotropic medications
- Not to discontinue medication quickly after long-term use
- To rise slowly because fainting may occur

TREATMENT OF OVERDOSE:

Lavage if orally ingested; VS, supportive care; IV norepinephrine for hypotension

hyoscyamine (Rx)

(hye-oh-sye'a-meen)

Anaspaz, Colidrops, Colytrol Pediatric, Cystospaz-M, ED-SPAZ, HyoMax, HyoMax SL, Hyosyne, Levisin SL, NuLev, Oscimin, Spasdel, Symax

Func. class.: Anticholinergic/antispasmodics

Chem. class.: Belladonna alkaloid

ACTION: Inhibits muscarinic actions of acetylcholine at postganglionic parasympathetic neuroeffector sites; reduces rigidity, tremors, hyperhidrosis of parkinsonism

USES: Treatment of peptic ulcer disease in combination with other products; other GI disorders, other spastic disorders, IBS, urinary incontinence

CONTRAINDICATIONS: Hypersensitivity to anticholinergics, closed-angle glaucoma, GI obstruction, myasthenia gravis, paralytic ileus, GI atony, toxic megacolon, prostatic hypertrophy, urinary tract obstruction

Precautions: Pregnancy (C), geriatric patients, hyperthyroidism, dysrhythmias, CHF, ulcerative colitis, hypertension, hiatal hernia, renal/hepatic disease, urinary retention, CAD

DOSAGE AND ROUTES

- **Adult/adolescent/child ≥12 yr: PO/SL** 0.125-0.25 mg q4hr; **EXT REL** 0.375-0.75 mg q12hr
- **Adult: IM/SUBCUT/IV** 0.25-0.5 mg in a single dose or 2-4×/day q6hr
- **Geriatric:** Max 1.5 mg/day in divided doses or max 4 biphasic tabs
- **Child 2-12 yr: PO** SL 0.0625-0.125 q4hr

Available forms: Tabs 0.125, 0.15 mg; ext rel caps 0.375 mg; sol 0.125 mg/ml; elix 0.125 mg/5 ml; sol for inj 0.5 mg/ml; SL tab 0.125 mg; tab, biphasic 0.125, 0.375 mg; orally disintegrating tab 0.125 mg

Administer:

PO route

- Do not break, crush, or chew ext rel caps
- ½ hr before meals for better absorption
- Decreased dose to geriatric patients; metabolism may be slowed

IV route

- Use undiluted, inject slowly

SIDE EFFECTS

CNS: *Confusion, stimulation in geriatric patients,* headache, insomnia, dizziness, drowsiness, anxiety, weakness, hallucination

CV: *Palpitations,* tachycardia

EENT: *Blurred vision,* photophobia, mydriasis, cycloplegia, increased ocular tension

GI: *Dry mouth, constipation, paralytic ileus,* heartburn, nausea, vomiting, dysphagia, absence of taste

GU: *Urinary hesitancy, retention,* impotence

INTEG: Urticaria, rash, pruritus, anhidrosis, fever, allergic reactions

PHARMACOKINETICS

PO: Duration 4-6 hr, metabolized by liver, excreted in urine, half-life 3.5 hr

INTERACTIONS

Increase: anticholinergic effect—amantadine, tricyclics, MAOIs, H_1-antihistamines

Decrease: hyoscyamine effect—antacids

Decrease: effect of phenothiazines, levodopa, ketoconazole

NURSING CONSIDERATIONS

Assess:

- VS, cardiac status: checking for dysrhythmias, increased rate, palpitations
- I&O ratio; check for urinary retention or hesitancy
- GI complaints: pain, nausea, vomiting, anorexia

Perform/provide:

- Storage in tight container protected from light
- Increased fluids, bulk, exercise to decrease constipation

Evaluate:

- Therapeutic response: absence of epigastric pain, bleeding, nausea, vomiting

Teach patient/family:

- To avoid driving, other hazardous activities until stabilized on medication
- To avoid alcohol or other CNS depressants; they will enhance sedating properties of this product
- To avoid hot environments because heat stroke may occur; that product suppresses perspiration
- To use sunglasses when outside to prevent photophobia; that product may cause blurred vision
- To notify prescriber if pregnancy is planned or suspected, pregnancy (C)

ibandronate (Rx)

(eye-ban'dro-nate)

Boniva

Func. class.: Bone-resorption inhibitor, electrolyte modifier

Chem. class.: Bisphosphonate

ACTION: Inhibits bone resorption, apparently without inhibiting bone formation and mineralization; absorbs calcium phosphate crystals in bone and may directly block dissolution of hydroxyapatite crystals of bone; more potent than other products

USES: Osteoporosis and prophylaxis

Unlabeled uses: Hypercalcemia of malignancy, osteolytic metastases, Paget's disease, osteoporosis (treatment/prevention) in those taking anastrozole

CONTRAINDICATIONS: Achalasia, esophageal stricture, hypocalcemia, intraarterial administration, renal failure, hypersensitivity to bisphosphonates

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, anemia, chemotherapy, coagulopathy, dental disease, diabetes mellitus, dysphagia, GI/renal disease, GERD, hypertension, infection, multiple myeloma, phosphate hypersensitivity, vit D deficiency

DOSAGE AND ROUTES

Postmenopausal osteoporosis

- **Adult: PO** 2.5 mg/day or 150 mg/mo; **IV BOL** 3 mg q3mo

Prophylaxis

- **Adult: PO** 2.5 mg/day or 150 mg/mo

Paget's disease (unlabeled)

- **Adult: IV** 2 mg as a single dose

Osteoporosis in those taking anastrozole (unlabeled)

- **Postmenopausal women: PO** 150 mg/mo

Osteolytic metastases (unlabeled)

- **Adult: IV** 6 mg over 1 hr × 3 days, repeat q4wk

Hypercalcemia (unlabeled)

- **Adult: IV INF** 2-4 mg over 2 hr

Renal dose

- **Adult: PO** CCr <30 ml/min, avoid use

Available forms: Tabs 2.5, 150 mg; sol for inj 1 mg/ml

Administer:

PO route

- Give early AM with a glass of water; if monthly, give on same day of each month

Direct IV route

- Use single-dose prefilled syringe; discard unused portion; give over 15-30 sec; give q3mo, do not use if discolored or contains particulates

SIDE EFFECTS

CNS: Fever, insomnia, dizziness, headache

CV: Hypertension, atrial fibrillation

EENT: Ocular pain/inflammation, uveitis

GI: Constipation, nausea, vomiting, diarrhea, dyspepsia

INTEG: Rash, inj site reaction

META: *Hypomagnesemia, hypophosphatemia, hypocalcemia,* hypercholesterolemia

MS: Bone pain, myalgia, osteonecrosis of the jaw

PHARMACOKINETICS

Half-life 5-60 hr, 86%-99% protein binding; taken up mainly by bones, primarily in areas of high bone turnover; eliminated primarily by kidneys

INTERACTIONS

Increase: neurotoxicity—aminoglycosides, cycloSPORINE, tacrolimus, NSAIDs, radiopaque contrast agents, vancomycin

Increase: hypocalcemia—loop diuretics

Decrease: ibandronate effect—calcium/vit D/iron/aluminum/magnesium salts; separate by 1 hr

Drug/Food

- Do not take with food, calcium

Increase: cholesterol

Drug/Lab Test
Decrease: Alk phos, magnesium, calcium, phosphate

NURSING CONSIDERATIONS

Assess:
- **Osteoporosis:** before and during treatment; DEXA scan for bone mineral density, correct electrolyte imbalances (calcium, magnesium, phosphate) before starting therapy
- Atrial fibrillation
- **Dental health:** before dental extraction, give antiinfectives, osteonecrosis of the jaw may occur
- Blood studies: electrolytes, creatinine/BUN, vit D: correct deficiencies prior to treatment
- For bone pain; use analgesics; may begin within 24 hr or even years after treatment; pain usually subsides after treatment is discontinued

Perform/provide:
- Storage at room temp

Evaluate:
- Therapeutic response: increased bone mineral density

Teach patient/family:
- **To report hypercalcemic relapse:** nausea, vomiting, bone pain, thirst, unusual muscle twitching, muscle spasms, severe diarrhea, constipation
- To continue with dietary recommendations, including calcium, vit D
- To obtain an analgesic from provider for bone pain
- That, if nausea, vomiting occur, small, frequent meals may help
- To report vision symptoms: blurred vision, edema, inflammation
- To report if pregnancy is planned or suspected or if planning to breastfeed, pregnancy (C)
- To exercise regularly, stop smoking, decrease alcohol intake
- To take PO first thing in AM at least 60 min before other medications, food, beverages, to take monthly dose on same day
- To sit upright for ≥60 min after PO

ibritumomab (Rx)

(ee-brit-u-moe'mab)
Zevalin
Func. class.: Radiopharmaceutical
Chem. class.: Monoclonal antibody

ACTION: High affinity for indium-111, yttrium-90; induces CD20+ B-cell lines

USES: Non-Hodgkin's lymphoma, B-cell NHL

CONTRAINDICATIONS: Pregnancy (D), hypersensitivity to murine proteins, prior murine antibody exposure

Black Box Warning: Hypersensitivity to this product, neutropenia, thrombocytopenia

Precautions: Breastfeeding, children, geriatric patients, cardiac conditions, immunizations after therapy

Black Box Warning: Altered biodistribution, infusion-related reaction

DOSAGE AND ROUTES

Step 1
- **Adult: IV** riTUXimab 250 mg/m² given first; premedicate with acetaminophen 650 mg and diphenhydrAMINE 50 mg

Step 2
- **Adult (baseline platelets ≥150,000/mm³):** 7-9 days after step 1, give a second dose of riTUXimab 250 mg/m²; within 4 hr of completing riTUXimab inf, give Y-90 ibritumomab tiuxetan 0.4 mCi/kg (14.8 MBq/kg) IV over 10 min, the dose given should be within 10% of actual prescribed dose of Y-90 ibritumomab tiuxetan, total dose given max 32 mCi (1184 MBq) regardless of patient's weight
- **Adult (baseline platelets 100,000-149,000/mm³):** 7-9 days after step 1, give a second dose of riTUXimab 250 mg/m² IV; within 4 hr of completing riTUXimab inf, give Y-90 ibritumomab tiuxetan 0.3 mCi/kg (11.1 MBq/kg) IV over 10 min;

the dose given should be within 10% of actual prescribed dose of Y-90 ibritumomab tiuxetan, total dose given max 32 mCi (1184 MBq) regardless of patient's weight

• **Adult (baseline platelets <100,000/mm³):** do not use

Available forms: Inj 3.2 mg/2 ml

Administer:

• Do not use as bolus or direct IV

• See manufacturer's product labeling for preparation

SIDE EFFECTS

CV: Cardiac dysrhythmias

GI: *Nausea, vomiting, anorexia,* abdominal pain, diarrhea

GU: Renal failure

HEMA: Leukopenia, neutropenia, thrombocytopenia, anemia

INTEG: *Irritation at site, rash,* fatal mucocutaneous infections (rare)

OTHER: Fever, chills, asthenia, headache, angioedema, hypotension, myalgia, bronchospasm, hemorrhage, infections, cough, dyspnea, dizziness, anxiety

SYST: Stevens-Johnson syndrome, secondary malignancies (AML, MDS), fatal infections

PHARMACOKINETICS

Half-life 30 hr

NURSING CONSIDERATIONS

Assess:

Black Box Warning: **Fatal inf reaction:** hypoxia, pulmonary infiltrates, ARDS, MI, ventricular fibrillation, cardiogenic shock; most fatal inf reactions occur with 1st inf; potentially fatal

• Biodistribution: 1st image 2-24 hr, 2nd image 48-72 hr, 3rd image 90-120 hr (optimal)

• For infection; murine antibody titers

Black Box Warning: **Severe mucocutaneous reactions:** Stevens-Johnson syndrome, lichenoid dermatitis, toxic epidermal lysis; occur 1-13 wk after product given

Black Box Warning: **Tumor lysis syndrome:** acute renal failure requiring hemodialysis, hyperkalemia, hypocalcemia, hyperuricemia, hyperphosphatemia

Black Box Warning: **Bone marrow depression:** CBC, differential, platelet count weekly; withhold product if WBC <3500/mm³, or platelet count <150,000/mm³; notify prescriber

• GI symptoms: frequency of stools

• Signs of dehydration: rapid respirations, poor skin turgor, decreased urine output, dry skin, restlessness, weakness

Perform/provide:

• Increased fluid intake to 2-3 L/day to prevent dehydration unless contraindicated

• Emergency equipment nearby with EPINEPHrine, antihistamines, corticosteroids

Evaluate:

• Therapeutic response: improvement in blood counts, decreased evidence of disease

Teach patient/family:

• To report adverse reactions

• To use contraception during and for 12 months after therapy; pregnancy (D)

• About radiation safety precautions, disposal of bodily fluids

• About symptoms of infection

• About neutropenia and bleeding precautions

ibuprofen (OTC, Rx)

(ibye-byoo-proe'fen)

Advil, Advil Children's, Advil Infants' Concentrated, Advil Junior Strength, Caldolor, ElixSure IB, Genpril, Ibren, IBU, Infants Leader Ibu-drops, Midol Cramps and Body Aches Formula, Motrin ✤, Motrin IB, Motrin Infant's, Motrin Junior Strength, Pamprin IB ✤, Samson-8 Select Brand, Top Care Infant, Wal-Profen

ibuprofen lysine (Rx)

NeoProfen

Func.class.: Nonsteroidal antiinflammatory, antipyretic, nonopioid analgesics

Chem. class.: Propionic acid derivative

Do not confuse:
Nuprin/Lupron

ACTION: Inhibits COX-1, COX-2 by blocking arachidonate; analgesic, antiinflammatory, antipyretic

USES: Rheumatoid arthritis, osteoarthritis, primary dysmenorrhea, gout, dental pain, musculoskeletal disorders, fever, migraine

Unlabeled uses: Ankylosing spondylitis, bone pain, cystic fibrosis, gouty arthritis, psoriatic arthritis

CONTRAINDICATIONS: Pregnancy (D) IV after 30 wks; hypersensitivity to this product, NSAIDs, salicylates; asthma; severe renal/hepatic disease

Black Box Warning: Perioperative pain in CABG

Precautions: Pregnancy (C) 1st and 2nd trimesters, breastfeeding, children, geriatric patients, bleeding disorders, GI disorders, cardiac disorders, hypersensitivity to other antiinflammatory agents, CHF, CCr <25 ml/min

Black Box Warning: GI bleeding, MI, stroke

DOSAGE AND ROUTES

Self-treatment of minor aches/pains

- **Adult/adolescent: PO** (OTC product) 200 mg q4-6hr, may increase to 400 mg q4-6hr if needed, max 1200 mg/day

Analgesic

- **Adult: PO** 200-400 mg q4-6hr, max 3.2 g/day; OTC use max 1200 mg/day
- **Child: PO** 4-10 mg/kg/dose q6-8hr

Moderate to severe pain (hospitalized patients) (Caldolor)

- **Adult: IV** 400-800 mg q6hr as an adjunct to opiate-agonist therapy

Dysmenorrhea

- **Adult: PO** 400 mg q4hr, max 1200 mg/day

Antipyretic

- **Child 6 mo-12 yr: PO** 5 mg/kg (temp <102.5° F or 39.2° C), 10 mg/kg (temp >102.5° F), may repeat q6-8hr, max 40 mg/kg/day

Antiinflammatory

- **Adult: PO** 400-800 mg tid-qid, max 3.2 g/day
- **Child: PO** 30-40 mg/kg/day in 3-4 divided doses, max 50 mg/kg/day

Patent ductus arteriosus (PDA) (NeoProfen)

- **Premature neonate ≤32 wk gestation who weighs 500-1500 g: IV** 10 mg/kg initially, then, if needed, 2 doses of 5 mg/kg at 24-hr intervals; if oliguria occurs, hold dose

Available forms: Tabs 100, 200, 400, 600, 800 mg; cap, liq gels 200 mg; oral susp 100 mg/5 ml; liq 100 mg/5 ml; chew tabs 50, 100 mg; drops 50 mg/1.25 ml; inj 10 mg/ml (NeoProfen); inj (Caldolor) 100 mg/ml

Administer:

PO route

- With food, milk, or antacid to decrease GI symptoms; if nausea and vomiting occur or persist, notify prescriber
- Shake susp well before use
- Do not use in pregnancy after 30 wks gestation

IV route

- Patient must be well hydrated prior to administration
- Dilute to ≤4 mg/ml with 0.9% NaCl, LR, D_5; infuse over ≥30 min; do not give IM
- Discard unused portion
- Visually inspect for particulate
- **Ibuprofen lysine:** dilute with dextrose or saline to appropriate volume (10 mg/kg of ibuprofen is recommended); give within 30 min of preparation; give via IV port nearest insertion site; give over 15 min
- Check for extravasation; do not give in same line with TPN; interrupt TPN for 15 min before and after product administration

SIDE EFFECTS

CNS: *Headache,* dizziness, drowsiness, fatigue, tremors, confusion, insomnia, anxiety, depression

CV: Tachycardia, peripheral edema, palpitations, dysrhythmias, CV thrombotic events, MI, stroke

EENT: Tinnitus, hearing loss, blurred vision

GI: Nausea, *anorexia,* vomiting, diarrhea, jaundice, hepatitis, constipation, flatulence, cramps, dry mouth, peptic ulcer, GI bleeding, ulceration, necrotizing enterocolitis, GI perforation

GU: Nephrotoxicity: dysuria, hematuria, oliguria, azotemia

HEMA: Blood dyscrasias, increased bleeding time

INTEG: Purpura, rash, pruritus, sweating, urticaria, necrotizing fasciitis, photosensitivity, photophobia

META: Hyperkalemia, hyperuricemia, hypoglycemia, hyponatremia

SYST: Anaphylaxis, Stevens-Johnson syndrome

PHARMACOKINETICS

PO: Onset ½ hr, peak 1-2 hr, half-life 1.8-2 hr, metabolized in liver (inactive metabolites), excreted in urine (inactive metabolites), 90%-99% plasma protein binding, does not enter breast milk, well absorbed

INTERACTIONS

Increase: bleeding risk—valproic acid, thrombolytics, antiplatelets, anticoagulants, salicylates

Increase: blood dyscrasia risk—antineoplastics, radiation

Increase: toxicity—lithium, oral anticoagulants, cycloSPORINE, methotrexate

Increase: GI reactions—aspirin, corticosteroids, NSAIDs, alcohol, tobacco

Increase: hypoglycemia—oral antidiabetics

Decrease: effect of antihypertensives, thiazides, furosemide

Decrease: ibuprofen action—aspirin

Drug/Herb

Increase: bleeding risk—feverfew, garlic, ginger, ginkgo, ginseng *(Panax)*

Drug/Lab Test

Increase: BUN, creatinine, LFTs

Decrease: Hgb/Hct, blood glucose, WBC, platelets

NURSING CONSIDERATIONS

Assess:

- Renal, hepatic, blood studies: BUN, creatinine, AST, ALT, Hgb, stool guaiac, before treatment, periodically thereafter, monitor electrolytes as needed

Black Box Warning: Perioperative pain in CABG: MI, and stroke can result for 10-14 days, can be fatal

- **Pain:** note type, duration, location, intensity with ROM 1 hr after administration
- Audiometric, ophthalmic exam before, during, after long-term treatment; for

eye, ear problems: blurred vision, tinnitus; may indicate toxicity
• **Infection,** may mask symptoms; fever: temp before and 1 hr after administration
• Cardiac status: edema (peripheral), tachycardia, palpitations; monitor B/P, pulse for character, quality, rhythm, especially in patients with cardiac disease, geriatric patients
• For history of peptic ulcer disorder; asthma, aspirin, hypersensitivity; check closely for hypersensitivity reactions

Black Box Warning: GI bleeding/perforation: chronic use can cause gastritis with or without bleeding, those with a prior history of peptic ulcer disease or GI bleeding, initiate treatment at lower dose; geriatric patients are at greater risk and those who consume >3 alcohol drinks/day

Perform/provide:
• Storage at room temp
Evaluate:
• Therapeutic response: decreased pain, stiffness in joints; decreased swelling in joints; ability to move more easily; reduction in fever or menstrual cramping
Teach patient/family:
• To use sunscreen, sunglasses, and protective clothing to prevent photosensitivity, photophobia
• To report blurred vision, ringing, roaring in ears (may indicate toxicity); that eye and hearing tests should be done during long-term therapy
• To avoid driving, other hazardous activities if dizziness or drowsiness occurs
⚠ **Nephrotoxicity:** to report change in urinary pattern, increased weight, edema, increased pain in joints, fever, blood in urine; monitor fluid status, BUN, creatinine
• That therapeutic antiinflammatory effects may take up to 1 mo
⚠ To avoid alcohol, NSAIDs, salicylates; bleeding may occur
• To report use of this product to all health care providers
• **Pregnancy:** notify prescriber if pregnancy (C) is planned or suspected, avoid during 3rd trimester pregnancy (D) IV after 30 wk

TREATMENT OF OVERDOSE:
Lavage, activated charcoal, induce diuresis

⚠ HIGH ALERT

ibutilide (Rx)
(eye-byoo'tih-lide)
Corvert
Func. class.: Antidysrhythmic (class III)
Chem. class.: Methane sulfonamide

ACTION:
Prolongs duration of action potential and effective refractory period

USES:
For rapid conversion of atrial fibrillation/flutter, including within 1 wk of coronary artery bypass or valve surgery

CONTRAINDICATIONS:
Hypersensitivity
Precautions: Pregnancy (C), breastfeeding, children <18 yr, geriatric patients, sinus node dysfunction, 2nd- or 3rd-degree AV block, electrolyte imbalances, bradycardia, renal/hepatic disease, CHF

Black Box Warning: QT prolongation, torsades de pointes, ventricular arrhythmias, ventricular tachycardia, cardiac dysrhythmias

DOSAGE AND ROUTES
Atrial fibrillation/flutter
• **Adult ≥60 kg: IV INF** 1 vial (1 mg) given over 10 min, may repeat same dose after 10 min
• **Adult <60 kg: IV INF** 0.01 mg/kg given over 10 min, may repeat same dose after 10 min
Available forms: Inj 0.1 mg/ml

Administer:

• Ice compress after stopping inf for extravasation, tubing should be removed and attempt to aspirate product, elevate affected areas

IV route

• Undiluted or diluted in 50 ml 0.9% NaCl, or D_5W (0.017 mg/ml); give over 10 min
• Solution is stable for 48 hr refrigerated or 24 hr at room temp
• Do not admix with other sol, products
• Reduce dosage slowly with ECG monitoring
• Stop infusion as soon as arrhythmia is controlled
• Do not use if discolored or particulate is present

SIDE EFFECTS

CNS: *Headache*
CV: *Hypotension, bradycardia,* sinus arrest, CHF, dysrhythmias, torsades de pointes, hypertension, extrasystoles, ventricular tachycardia, bundle branch block, AV block, palpitations, supraventricular extrasystoles, syncope, prolonged QT interval
GI: Nausea

PHARMACOKINETICS

Elimination half-life 6 hr, metabolized by liver, excreted by kidneys

INTERACTIONS

Increase: prodysrhythmia—phenothiazines, tricyclics, tetracyclics, antidepressants, H_1-receptor antagonists, antihistamines
Increase: masking of cardiotoxicity—digoxin
• Do not use within 5 hr of ibutilide: class Ia antidysrhythmics (disopyramide, quiNIDine, procainamide), class III agents (amiodarone, sotalol)

NURSING CONSIDERATIONS

Assess:

Black Box Warning: ECG continuously for ≥4 hr to determine product effectiveness; measure PR, QRS, QT intervals, check for PVCs, other dysrhythmias; discontinue if atrial fibrillation/flutter ceases; continue until QT interval corrected for heart rate (QTc) returned to baseline; if used ≥2 days, anticoagulation must be adequate

• I&O ratio; electrolytes: K, Na, Cl
• Hepatic studies: AST, ALT, bilirubin, alk phos
• Dehydration or hypovolemia
• Rebound hypertension after 1-2 hr
• Cardiac rate, respiration: rate, rhythm, character, chest pain

Evaluate:

• Therapeutic response: decrease in atrial fibrillation/flutter

Teach patient/family:

• To report side effects immediately
• About reason for medication

⚠ HIGH ALERT

IDArubicin (Rx)

(eye-dah-roob'ih-sin)

Idamycin PFS

Func. class.: Antineoplastic, antibiotic
Chem. class.: Anthracycline glycoside

Do not confuse:
IDArubicin/DOXOrubicin/DAUNOrubicin/epirubicin
Idamycin/Adriamycin

ACTION: Non–cell-cycle specific; topoisomerase II inhibitor; vesicant; intercalcalating between DNA base pairs, causing shape change, low free radicals

USES: Used in combination with other antineoplastics for acute myelocytic leukemia in adults
Unlabeled uses: Breast cancer, liquid tumors, non-Hodgkin's lymphoma, ALL, CLL, AML

CONTRAINDICATIONS:

Pregnancy (D), breastfeeding, hypersensitivity

Black Box Warning: Myelosuppression, bilirubin >5 mg/dl

Precautions: Children, gout, bone marrow depression, preexisting CV disease

Black Box Warning: Renal/hepatic disease, heart failure

DOSAGE AND ROUTES

- **Adult: IV** 8-12 mg/m²/day × 3 days in combination with cytarabine (induction)
- **Adolescent/child (unlabeled): IV** 10-12 mg/m²/day × 3 days

Renal/hepatic dose

- **Adult: IV** CCr >2.5 mg/dl, reduce dose; bilirubin 2.5-5 mg/dl, reduce dose by 50%; bilirubin >5 mg/dl, do not use

Available forms: Inj 1 mg/ml

Administer:

- Ice compress after stopping inf for extravasation

Intermittent IV INF route

- Do not give IM/SUBCUT
- Use cytotoxic handling procedures after preparing in biologic cabinet wearing gown, gloves, mask
- Antiemetic 30-60 min before product and 6-10 hr after treatment to prevent vomiting
- After reconstituting 5-mg vial with 5 ml 0.9% NaCl (1 mg/1 ml); give over 10-15 min through Y-tube or 3-way stopcock of inf of D_5 or NS; discard unused portion; use caution when needle inserted into vial (negative pressure)

Y-site compatibilities: Amifostine, amikacin, aztreonam, cimetidine, cladribine, cyclophosphamide, cytarabine, diphenhydrAMINE, droperidol, erythromycin, filgrastim, granisetron, imipenem/CISplatin, magnesium sulfate, mannitol, melphalan, metoclopramide, potassium chloride, ranitidine, sargramostim, thiotepa, vinorelbine

SIDE EFFECTS

CNS: Fever, chills, *headache*, seizures
CV: Dysrhythmias, CHF, pericarditis, myocarditis, peripheral edema, angina, MI, myocardial toxicity
GI: *Nausea, vomiting, abdominal pain, mucositis, diarrhea*, hepatotoxicity
GU: Nephrotoxicity, red urine
HEMA: Thrombocytopenia, leukopenia, anemia
INTEG: Rash, extravasation, dermatitis, *reversible alopecia*, urticaria; thrombophlebitis and tissue necrosis at inj site; radiation recall
SYST: Infection, tumor lysis syndrome

PHARMACOKINETICS

Half-life 22 hr; metabolized by liver; crosses placenta; excreted in bile, urine (primarily as metabolites); 97% protein binding

INTERACTIONS

Increase: bleeding risk—anticoagulants, salicylates, NSAIDs, thrombolytics; avoid concurrent use
Decrease: IDArubicin effect—corticosteroids
Increase: CHF, ventricular dysfunction—trastuzumab
Increase: ECG changes (QT prolongation, changes in QRS voltage)—class IA/III antidysrhythmias, some phenothiazines, and other products that increase QT prolongation
Increase: cardiotoxicity—cyclophosphamide
Increase: toxicity—other antineoplastics or radiation
Decrease: antibody response—live virus vaccines

Drug/Lab Test

Decrease: calcium, platelets, neutrofils
Increase: uric acid, phosphate, potassium

NURSING CONSIDERATIONS

Assess:

Black Box Warning: CBC, differential, platelet count weekly; notify prescriber of results, severe myelosuppression can occur

- Renal studies: BUN, serum uric acid, urine CCr, electrolytes before, during therapy

⚠ Tumor lysis syndrome: hyperkalemia, hyperphosphatemia, hyperuricemia, hypocalcemia

- I&O ratio; report fall in urine output to <30 ml/hr
- Monitor temp; fever may indicate beginning infection

Black Box Warning: Hepatic studies before, during therapy: bilirubin, AST, ALT, alk phos prn or monthly; check for jaundice of skin and sclera, dark urine, clay-colored stools, itchy skin, abdominal pain, fever, diarrhea

Black Box Warning: Cardiac toxicity: CHF, dysrythmias, cardiomyopathy; cardiac studies before and periodically during treatment: ECG, chest x-ray, MUGA; ECG: watch for ST-T wave changes, low QRS and T, possible dysrhythmias (sinus tachycardia, heart block, PVCs)

- **Bleeding:** hematuria, guaiac stools, bruising or petechiae, mucosa or orifices
- Effects of alopecia on body image; discuss feelings about body changes
- Inflammation of mucosa, breaks in skin
- Buccal cavity for dryness, sores, ulceration, white patches, oral pain, bleeding, dysphagia

Black Box Warning: Local irritation, pain, burning at inj site; extravasation (vesicant)

- GI symptoms: frequency of stools, cramping

Perform/provide:

- Strict handwashing technique, gloves, protective clothing
- Increase fluid intake to 2-3 L/day to prevent urate and calculi formation
- Rinsing of mouth tid-qid with water, club soda; brushing of teeth tid-qid with soft brush or cotton-tipped applicators for stomatitis; use unwaxed dental floss
- Storage at room temp for 3 days after reconstituting or 7 days refrigerated

Evaluate:

- Therapeutic response: decreased liquid tumor, spread of malignancy

Teach patient/family:

- To report signs of CHF, cardiac toxicity, beginning infection
- That hair may be lost during treatment; that wig or hairpiece may make patient feel better; that new hair may be different in color, texture
- To avoid foods with citric acid, hot or rough texture
- To avoid crowds, persons with upper respiratory illness
- To report any bleeding, white spots, ulcerations in mouth; to examine mouth daily
- That urine may be red-orange for 48 hr
- To report if pregnancy is planned or suspected, pregnancy (D)
- To use contraception during treatment, for ≥4 mo after treatment
- That all body fluids will change color

⚠ HIGH ALERT

ifosfamide (Rx)

(i-foss'fa-mide)

Ifex

Func. class.: Antineoplastic alkylating agent

Chem. class.: Nitrogen mustard

Do not confuse:

ifosfamide/cyclophosphamide

ACTION: Alkylates DNA, RNA, inhibits enzymes that allow synthesis of amino acids in proteins; also responsible for cross-linking DNA strands; activity is not cell-cycle–stage specific

USES: Testicular cancer

Unlabeled uses: Soft-tissue sarcoma, Ewing's sarcoma, non-Hodgkin's lymphoma, lung/pancreatic sarcoma, bladder, breast, cervical, thymic cancer, desmoid tumor, Ewing's sarcoma, rhabdomyosarcoma

CONTRAINDICATIONS:

Pregnancy (D), hypersensitivity

Black Box Warning: Bone marrow suppression

Precautions: Breastfeeding, children, renal/hepatic disease, accidental exposure, dehydration, dental disease, infection, IM injection, ocular exposure varicella

Black Box Warning: Coma, hemorrhagic cystitis

DOSAGE AND ROUTES

• **Adult: IV** 1.2-2 g/m^2/day × 5 days, repeat course q3wk, given with mesna, epirubicin, ondansetron alpha

Renal dose

• **Adult: IV** CCr 31-60 ml/min, give 75% of dose; CCr 10-30 ml/min, give 50% of dose; CCr <10 ml/min, do not give

Available forms: Inj 1-, 3-g vials

Administer:

• Antiemetic 30-60 min before product to prevent vomiting

• Visually inspect parenteral products for particulate matter and discoloration before use

IV route

• Give as an intermittent infusion or continuous infusion

• Well hydrate with ≥2 L/day of oral or IV fluids to prevent bladder toxicity

• Must be given in combination with mesna to prevent hemorrhagic cystitis

• Close hematologic monitoring is recommended; WBC count, platelet count, and hemoglobin should be obtained before each use and periodically thereafter

• A urinalysis should be performed before each dose to monitor for hematuria

Reconstitution and further dilution:

• Reconstitute 1 or 3 grams with 20 or 60 ml, respectively, of sterile water for injection or bacteriostatic water for injection containing parabens or benzyl alcohol to give IV solutions containing 50 mg/ml

• Solutions may be diluted further to achieve concentrations of 0.6–20 mg/ml in the following solutions: 5% dextrose for injection, 0.9% sodium chloride for injection, lactated Ringer's for injection, or sterile water for injection

• Infuse slowly over at least 30 min

• Diluted and reconstituted solutions must be refrigerated and used within 24 hr

Additive compatibilities: CARBOplatin, CISplatin, etoposide, fluorouracil, mesna

Y-site compatibilities: Allopurinol, amifostine, amphotericin B cholesteryl, aztreonam, DOXOrubicin liposome, filgrastim, fludarabine, gallium, granisetron, melphalan, ondansetron, PACLitaxel, piperacillin/tazobactam, propofol, sargramostim, sodium bicarbonate, teniposide, thiotepa, vinorelbine

SIDE EFFECTS

CNS: Facial paresthesia, fever, malaise, somnolence, confusion, depression, hallucinations, dizziness, disorientation, seizures, coma, cranial nerve dysfunction, encephalopathy

GI: Nausea, vomiting, anorexia, hepatotoxicity, stomatitis, dyslipidemia, hyperglycemia, constipation, diarrhea

GU: Hematuria, nephrotoxicity, hemorrhagic cystitis, dysuria, urinary frequency

HEMA: Thrombocytopenia, leukopenia, anemia, retrograde ejaculation

INTEG: Dermatitis, alopecia, pain at inj site, hyperpigmentation

META: Metabolic acidosis

PHARMACOKINETICS

Metabolized by liver, saturation occurs at high doses, excreted in urine, half-life 7-15 hr, depends on dose

INTERACTIONS

Increase: myelosuppression—other antineoplastics, radiation
Increase: toxicity—CYP3A4, a weak P-gp inhibitor, inducers, barbiturates, allopurinol
Increase: bleeding risk—NSAIDs, anticoagulants, salicylates, thrombolytics
Decrease: antibody response—live virus vaccines
Decrease: effect of ifosfamide—CYP3A4 inhibitors
• Do not use within 24 hr of hematopoietic progenitor cells

NURSING CONSIDERATIONS

Assess:
• Hepatic studies before, during therapy (bilirubin, AST, ALT, LDH) monthly or as needed; jaundice of skin and sclera, dark urine, clay-colored stools, itchy skin, abdominal pain, fever, diarrhea

Black Box Warning: CBC, differential, platelet count weekly; withhold product if WBC <2000 or platelet count <50,000; notify prescriber; severe myelosuppression may occur

• Monitor temp (may indicate beginning infection)
• Blood dyscrasias (anemia, granulocytopenia); bruising, fatigue, bleeding, poor healing
• Allergic reactions: dermatitis, exfoliative dermatitis, pruritus, urticaria

Black Box Warning: I&O ratio; monitor for hematuria; hemorrhagic cystitis can occur; increase fluids to 3 L/day; urinalysis before each dose, not to give at night

Black Box Warning: Neurologic symptoms: hallucinations, confusion, disorientation, coma; product should be discontinued

• Bleeding: hematuria, guaiac, bruising or petechiae, mucosa or orifices
Perform/provide:
• Storage of powder at room temp
Evaluate:
• Therapeutic response: decrease in size and spread of tumor

Teach patient/family:
• To notify prescriber of sore throat, swollen lymph nodes, malaise, fever; other infections may occur
• Not to have vaccinations during or after treatment
• That hair may be lost during treatment; that wig or hairpiece may make the patient feel better; that new hair may be different in color, texture
• To report signs of anemia: fatigue, headache, faintness, SOB, irritability
• To report bleeding; to avoid use of razors, commercial mouthwash
• To avoid use of aspirin products, NSAIDs, ibuprofen because hemorrhage can occur
• To notify prescriber if pregnancy is planned or suspected, pregnancy (D)
• To use contraceptive measures during therapy; not to breastfeed
• To avoid crowds, persons with infections
• To report confusion, hallucinations, extreme drowsiness, numbness, tingling; to avoid alcohol use for ≥4 mo after treatment
• To avoid driving, hazardous activities until reaction is known
• To use excessive fluids and urinate often to prevent hemorrhagic cystitis

iloperidone (Rx)

(ill-o-pehr'ih-dohn)
Fanapt
Func. class.: Antipsychotic
Chem. class.: Benzisoxazole derivative

ACTION: Unknown; may be mediated through both dopamine type 2 (D2) and serotonin type 2 (5-HT2) antagonism

USES: Schizophrenia

CONTRAINDICATIONS: Breastfeeding, hypersensitivity
Precautions: Pregnancy (C), children, geriatric patients, renal/hepatic disease,

breast cancer, Parkinson's disease, dementia with Lewy bodies, seizure disorder, QT prolongation, bundle branch block, acute MI, ambient temperature increase, AV block, stroke, substance abuse, suicidal ideation, tardive dyskinesia, torsade de pointes, blood dyscrasias

Black Box Warning: Increased mortality in elderly patients with dementia-related psychosis

DOSAGE AND ROUTES

• **Adult: PO** 1 mg bid day 1, 2 mg bid day 2, 4 mg bid day 3, 6 mg bid day 4, 8 mg bid day 5, 10 mg bid day 6, 12 mg bid day 7; max 24 mg/day in 2 divided doses; reduce dose by 50% in patient who is a poor metabolizer of CYP2D6 or when used with strong CYP2D6/CYP3A4 inhibitors

Available forms: Tabs 1, 2, 4, 6, 8, 10, 12 mg; titration pack

Administer:

• Use without regard to meals
• Reduced dose in geriatric patients
• Anticholinergic agent for EPS
• Avoid use with CNS depressants

SIDE EFFECTS

CNS: *EPS, pseudoparkinsonism, akathisia, dystonia, tardive dyskinesia; drowsiness,* seizures, neuroleptic malignant syndrome, dizziness, delirium, depression, paranoia, fatigue, hostility, lethargy, restlessness, vertigo, tremor

CV: Orthostatic hypotension, heart failure, AV block, QT prolongation, tachycardia

EENT: Blurred vision, cataracts, nystagmus, tinnitus

GI: *Nausea,* vomiting, *anorexia, constipation,* jaundice, weight gain/loss, abdominal pain, stomatitis

GU: Hyperprolactinemia, urinary retention/incontinence, testicular pain, renal failure

HEMA: Agranulocytosis, leukopenia, neutropenia

MISC: Renal artery occlusion, hyperglycemia, dyslipidemia

PHARMACOKINETICS

PO: Extensively metabolized by liver to major active metabolite by CYP2D6, CYP3A4; protein binding 95%; peak 2-4 hr; excreted in urine and feces; terminal half-life 18 hr in extensive metabolizers; 33 hr in poor metabolizers

INTERACTIONS

Increase: serotonin syndrome, neuroleptic malignant syndrome—SSRIs, SNRI

Increase: sedation—other CNS depressants, alcohol

Increase: iloperidone effect, decreased clearance—CYP2D6, CYP3A4 inhibitors (delavirdine, indinavir, isoniazid, itraconazole, dalfopristin, ritonavir, tipranavir), reduce dose

Increase: QT prolongation—class IA/ III antidysrhythmics, some phenothiazines, β-agonists, local anesthetics, tricyclics, haloperidol, methadone, chloroquine, clarithromycin, droperidol, erythromycin, pentamidine

Decrease: iloperidone action—CYP2D6, CYP3A4 inducers (carBAMazepine, barbiturates, phenytoins, rifampin)

Drug/Lab Test

Increase: prolactin levels, cholesterol, glucose, lipids, triglycerides

Decrease: potassium

NURSING CONSIDERATIONS

Assess:

• Mental status before initial administration
• I&O ratio; palpate bladder if urinary output is low
• Bilirubin, CBC, hepatic studies monthly, monitor glucose, hyperglycemia may occur
• Urinalysis before, during prolonged therapy, monitor potassium, magnesium and lipid panel
• Affect, orientation, LOC, reflexes, gait, coordination, sleep-pattern disturbances
• B/P standing and lying; pulse, respirations; q4hr during initial treatment; establish baseline before starting treatment; report drops of 30 mm Hg; watch

for ECG changes; QT prolongation may occur; dizziness, faintness, palpitations, tachycardia on rising
• EPS, including akathisia, tardive dyskinesia (bizarre movements of the jaw, mouth, tongue, extremities), pseudoparkinsonism (rigidity, tremors, pill rolling, shuffling gait)

Black Box Warning: Serious reactions in the geriatric patient: fatal pneumonia, heart failure, sudden death, not to be used in the elderly with dementia

Black Box Warning: Neuroleptic malignant syndrome: hyperthermia, increased CPK, altered mental status, muscle rigidity

• Constipation, urinary retention daily; if these occur, increase bulk and water in diet
• Weight gain, hyperglycemia, metabolic changes in diabetes

Perform/provide:
• Supervised ambulation until patient is stabilized on medication; do not involve patient in strenuous exercise program because fainting is possible; patient should not stand still for long periods
• Sips of water, candy, gum for dry mouth
• Storage in tight, light-resistant container (PO)

Evaluate:
• Therapeutic response: decrease in emotional excitement, hallucinations, delusions, paranoia; reorganization of patterns of thought, speech

Teach patient/family:
• That orthostatic hypotension may occur; to rise from sitting or lying position gradually
• To avoid hot tubs, hot showers, tub baths because hypotension may occur; that heat stroke may occur in hot weather; to take extra precautions to stay cool
• To avoid abrupt withdrawal of product because EPS may result; that product should be withdrawn slowly, to review symptoms of neuroleptic malignant syndrome
• To avoid OTC preparations (cough, hay fever, cold) unless approved by prescriber because serious product interactions may occur; to avoid use of alcohol because increased drowsiness may occur
• To avoid hazardous activities if drowsy or dizzy
• To comply with product regimen
• To report impaired vision, tremors, muscle twitching
• To use contraception; to inform prescriber if pregnancy is planned or suspected

TREATMENT OF OVERDOSE: Lavage if orally ingested; provide airway; *do not induce vomiting*

imatinib (Rx)

(im-ah-tin'ib)

Gleevec

Func. class.: Antineoplastic—miscellaneous

Chem. class.: Protein-tyrosine kinase inhibitor

ACTION: Inhibits Bcr-Abl tyrosine kinase created in patients with chronic myeloid leukemia (CML), also inhibits tyrosine kinases including EGF, FGF, PDGF, SCF, VEGF, NFG

USES: Treatment of chronic myeloid leukemia (CML); Philadelphia-chromosome–positive patients in blast-cell crisis or patients in chronic failure after treatment failure with interferon alfa; gastrointestinal stromal tumors (GIST) positive for c-Kit; chronic eosinophilic leukemia, acute lymphocytic leukemia, dermatofibrosarcoma protuberans, myelodysplastic syndrome, systemic mastocytosis
Unlabeled uses: Desmoid tumor

CONTRAINDICATIONS: Pregnancy (D), hypersensitivity
Precautions: Breastfeeding, children, geriatric patients, cardiac/renal/hepatic/

dental disease, GI bleeding, bone marrow suppression, infection, thrombocytopenia, neutropenia, immunosuppression

DOSAGE AND ROUTES

For the treatment of Philadelphia chromosome positive (Ph+) chronic myelogenous leukemia (CML) chronic phase as initial therapy

• **Adult: PO** 400 mg/day, continue as long as beneficial; may increase to 600 mg/day in the absence of severe adverse reactions and severe non–leukemia-related neutropenia or thrombocytopenia

• **Adolescent/child >2 yr: PO** 340 mg/m²/day, max 600 mg/day; the daily dose may be given as a single dose or split into 2 doses given once in the morning and once in the evening

Adult with Ph+ CML in chronic phase after the failure of interferon-alfa therapy

• **Adult: PO** 400 mg every day; continue as long as beneficial, may increase to 600 mg/day

Pediatric patients with Ph+ chronic phase CML whose disease has recurred after hematopoietic stem cell transplant or who are resistant to interferon-alfa therapy

• **Adolescent/child >3 yr: PO** 260 mg/m²/day as a single daily dose, or the dose may be divided given once in the morning and once in the evening; may increase to 340 mg/m²/day

Patients with Ph+ CML in accelerated phase or blast crisis

• **Adult: PO** 600 mg every day, continue as long as beneficial, may increase to 800 mg/day (400 mg bid)

Resistant or relapsed PH+ acute lymphocytic leukemia (ALL)

• **Adult: PO** 600 mg every day, continue as long beneficial

***Kit* (CD117)-positive unresectable and/or metastatic GIST**

• **Adult: PO** 400–600 mg every day, may increase to 400 mg bid

Adjuvant treatment of *Kit* (CD117)-positive GIST after complete gross resection

• **Adult: PO** 400 mg/day

Patients with hypereosinophilic syndrome (HES) and/or chronic eosinophilic leukemia (CEL) who have the FIPL1L1-PDGFR α-fusion kinase (mutational analysis or FISH demonstration of CHIC2 allele deletion) and for patients with HES and/or CEL who are FIPL1L-PDGFR α-fusion kinase negative or unknown

• **Adult: PO** 400 mg/day in those who are FIPL1L-PDGFR α-fusion kinase negative or unknown; for HES/CEL patients with demonstrated FIP1L1-PDGFR α-fusion kinase, 100 mg/day, may increase to 400 mg

Myelodysplastic syndrome (MDS)/myeloproliferative disease (MPD) associated with the PDGFR (platelet-derived growth factor receptor) gene rearrangements

• **Adult: PO** 400 mg/day

Aggressive systemic mastocytosis (ASM) without D816V c-Kit mutation or with c-Kit mutation status unknown

• **Adult: PO** 400 mg/day in those without the FIP1L1-PDGFR-α c-Kit mutation; if c-Kit status is unknown or not available, give 400 mg/day

Unresectable, recurrent, and/or metastatic dermatofibrosarcoma protuberans (DFSP)

• **Adult: PO** 400 mg bid (800 mg/day)

Renal dose

• **Adult: PO** CCr 40-59 ml/min, max 600 mg/day; CCr 20-39 ml/min, decrease initial dose by 50%, max 400 mg/day; CCr <20 ml/min, use with caution, 100 mg/day

Hepatic dose

• **Adult: PO** Total bilirubin 1.5-3 × ULN and any AST, decrease initial dose to 400 mg/day; total bilirubin >3 × ULN and any AST, decrease initial dose to 300 mg/day

Available forms: Tabs 100, 400 mg

Administer:
- With meal and large glass of water to decrease GI symptoms; doses of 800 mg should be given as 400 mg bid
- Tab may be dispersed in a glass of water or apple juice, use 50 ml of liquid for 100-mg tab, 200 ml liquid for 400-mg tab
- Continue as long as beneficial

SIDE EFFECTS

CNS: CNS hemorrhage, headache, dizziness, insomnia
CV: Hemorrhage, heart failure, cardiac tamponade, hypereosinophilia, cardiac toxicity
EENT: Blurred vision, conjunctivitis
GI: *Nausea,* hepatotoxicity, vomiting, dyspepsia, GI hemorrhage, *anorexia, abdominal pain,* GI perforation, diarrhea
HEMA: Neutropenia, thrombocytopenia, bleeding
INTEG: *Rash, pruritus,* alopecia, photosensitivity
META: Fluid retention, hypokalemia, edema
MISC: Fatigue, epistaxis, pyrexia, night sweats, increased weight, flulike symptoms, hypothyroidism
MS: Cramps, pain, arthralgia, myalgia
RESP: Cough, dyspnea, nasopharyngitis, pneumonia, upper respiratory tract infection, pleural effusion, edema

PHARMACOKINETICS

Well absorbed (98%); protein binding 95%; metabolized by CYP3A4; excreted in feces, small amount in urine; peak 2-4 hr; duration 24 hr (imatinib), 40 hr (metabolite); half-life 18-40 hr

INTERACTIONS

Increase: hepatotoxicity—acetaminophen
Increase: imatinib concentrations—CYP3A4 inhibitors (ketoconazole, itraconazole, erythromycin, clarithromycin)
Increase: plasma concentrations of simvastatin, calcium channel blockers, ergots
Increase: plasma concentration of warfarin; avoid use with warfarin; use low-molecular-weight anticoagulants instead
Decrease: imatinib concentrations—CYP3A4 inducers (dexamethasone, phenytoin, carBAMazepine, rifampin, PHENObarbital)

Drug/Herb
Decrease: imatinib concentration—St. John's wort

Drug/Lab Test
Increase: bilirubin, amylase, LFTs
Decrease: albumin, calcium, potassium, sodium, phosphate, platelets, neutrophils, leukocytes, lymphocytes

NURSING CONSIDERATIONS

Assess:
- **Bone marrow suppression:** ANC, platelets; during chronic phase, if ANC $< 1 \times 10^9$/L and/or platelets $< 50 \times 10^9$/L, stop until ANC $> 1.5 \times 10^9$/L and platelets $> 75 \times 10^9$/L; during accelerated phase/blast crisis, if ANC $< 0.5 \times 10^9$/L and/or platelets $< 10 \times 10^9$/L, determine whether cytopenia related to biopsy/aspirate; if not, reduce dose by 200 mg; if cytopenia continues, reduce dose by another 100 mg; if cytopenia continues for 4 wk, stop product until ANC $\geq 1 \times 10^9$/L
- **Renal toxicity:** if bilirubin $> 3 \times$ IULN, withhold imatinib until bilirubin levels return to $< 1.5 \times$ IULN
- **Hepatotoxicity:** monitor LFTs, before treatment monthly; if liver transaminases $> 5 \times$ IULN, withhold imatinib until transaminase levels return to $< 2.5 \times$ IULN
- Monitor CBC for first month, biweekly next month and periodically thereafter; neutropenia (2-3 wk) and thrombocytopenia (3-4 wk) and anemia may occur; may need dosage decrease or discontinuation
- Signs of fluid retention, edema: weigh, monitor lung sounds, assess for edema; some fluid retention is dose dependent

Perform/provide:
- Nutritious diet with iron, vit supplement, low fiber, few dairy products
- Storage at 77° F (25° C)

Evaluate:
• Therapeutic response: decrease in leukemic cells or size of tumor
Teach patient/family:
• To report adverse reactions immediately: shortness of breath, swelling of extremities, bleeding
• About reason for treatment, expected results
• That effect on male infertility is unknown
• Not to stop or change dose—to avoid hazardous activities until response is known, dizziness may occur
• To take with food and water; for those unable to swallow tabs, to mix in liquid (30 m for 100 mg) or 200 ml for 400 mg) after dissolved, stir and consume
• To avoid OTC products unless approved by prescriber
• To notify prescriber if pregnancy is planned or suspected, pregnancy (D), do not breastfeed

imipenem/cilastatin (Rx)

(i-me-pen'em sye-la-stat'in)

Primaxin IM, Primaxin IV

Func. class.: Antiinfective—miscellaneous

Chem. class.: Carbapenem

Do not confuse:
imipenem/Omnipen
Primaxin/Premarin

ACTION: Interferes with cell-wall replication of susceptible organisms; osmotically unstable cell wall swells, bursts from osmotic pressure; addition of cilastatin prevents renal inactivation that occurs with high urinary concentrations of imipenem

USES: Serious infections caused by gram-positive *Streptococcus pneumoniae,* group A β-hemolytic streptococci, *Staphylococcus aureus,* enterococcus; gram-negative *Klebsiella, Proteus, Escherichia coli, Acinetobacter, Serratia, Pseudomonas aeruginosa, Salmonella, Shigella, Haemophilus influenzae, Listeria* sp.

CONTRAINDICATIONS: Hypersensitivity to this product or amide local anesthetics, or carbapenems; AV block, shock (IM)

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, seizure disorders, renal disease, head trauma; hypersensitivity to cephalosporins, penicillins; pseudomembranous colitis, ulcerative colitis

DOSAGE AND ROUTES

Intraabdominal, gynecologic, lower respiratory tract, skin and skin structure, bone and joint infections; septicemia, endocarditis, febrile neutropenia (unlabeled), and polymicrobial infections for fully susceptible organisms including gram-positive or gram-negative aerobes and anaerobes

• **Adult ≥70 kg: IV** 250 mg every 6 hr (mild infections); 500 mg every 6–8 hr (moderate infections); 500 mg every 6 hr (severe life-threatening infections)
• **Adult 60 kg: IV** 250 mg IV every 8 hr (mild infections); 250 mg every 6 hr (moderate or severe life-threatening infections)
• **Adult 50 kg: IV** 125 mg every 6 hr (mild infections) 250 mg every 6 hr (moderate or severe life-threatening infections)
• **Adult 40 kg: IV** 125 mg every 6 hr (mild infections); 250 mg every 6–8 hr (moderate infections); 250 mg every 6 hr (severe life-threatening infections)
• **Adult 30 kg: IV** 125 mg every 8 hr (mild infections); 125 mg every 6 hr or 250 mg every 8 hr (moderate infections); 250 mg every 8 hr (severe life-threatening infections)
• **Adolescent/child/infant ≥3 mo: IV** 15–25 mg/kg every 6 hr
• **Infant 1–3 mo and ≥1500 g: IV** 25 mg/kg every 6 hr
• **Neonate 1–4 wk and ≥1500 g: IV** 25 mg/kg every 8 hr

• **Neonate <7 days and ≥1500 g: IV** 25 mg/kg every 12 hr

Moderately susceptible organisms, primarily some strains of *P. aeruginosa*

• **Adult ≥70 kg: IV** 500 mg every 6 hr (mild infections); 500 mg every 6 hr or 1 g every 8 hr (moderate infections); 1 g every 6–8 hr (life-threatening infections)

• **Adult 60 kg: IV** 500 mg every 8 hr (mild infections); 500 mg every 8 hr or 750 mg every 8 hr (moderate infections); 0.75–1 g every 8 hr (life-threatening infections)

• **Adult 50 kg: IV** 250 mg every 6 hr (mild infections); 250–500 mg every 6 hr (moderate infections); 500 mg every 6 hr or 750 mg every 8 hr (life-threatening infections)

• **Adult 40 kg: IV** 250 mg every 6 hr (mild infections); 250 mg every 6 hr or 500 mg every 8 hr (moderate infections); 500 mg every 6–8 hr (life-threatening infections)

• **Adult 30 kg: IV** 250 mg every 8 hr (mild infections); 250 mg every 6–8 hr; 250 mg every 6 hr or 500 mg every 8 hr (life-threatening infections)

• **Adolescent/child/infant ≥3 mo: IV** 15–25 mg/kg every 6 hr

• **Infant 1–3 mo weighing ≥1500 g: IV** 25 mg/kg every 6 hr

• **Neonate 1–4 wk weighing ≥1500 g: IV** 25 mg/kg every 8 hr

• **Neonate <7 days weighing ≥1500 g: IV** 25 mg/kg every 12 hr

Mild to moderate lower respiratory tract, skin and skin structure, or gynecologic infections

• **Adult/adolescent/child ≥12 yr: IM** 500 or 750 mg every 12 hr, max 1.5 g/day

Mild to moderate intraabdominal infections, including acute gangrenous or perforated appendicitis and appendicitis with peritonitis

• **Adult/adolescent/child ≥12 yr: IM** 750 mg every 12 hr, max 1.5 g/day

Community-acquired pneumonia (CAP) in ICU patients with risk factors for *Pseudomonas* infection

• Imipenem; cilastatin in combination with ciprofloxacin or an aminoglycoside plus a respiratory fluoroquinolone or an advanced macrolide

• **Adult ≥70 kg: IV** 500 mg every 6–8 hr

• **Adult 60 kg: IV** 250 mg every 6 hr

• **Adult 50 kg: IV** 250 mg every 6 hr

• **Adult 40 kg: IV** 250 mg every 6–8 hr

• **Adult 30 kg: IV** 125 mg every 6 hr or 250 mg every 8 hr

Empiric treatment of aspiration pneumonia

• **Adult: IV** 500–1000 mg every 6 hr × 10 days

Renal dose

• **Adult ≥70 kg (reduce normal dose of 1 g/day to): IV** CCr 41-70 ml/min, 250 mg q8hr; CCr 6-40 ml/min, 250 mg q12hr; *(reduce normal dose of 1.5 g/day to):* CCr 41-70 ml/min, 250 mg q6hr; CCr 21-40 ml/min, q8hr; CCr 6-20 ml/min, 250 mg q12hr; *(reduce normal dose of 2 g/day to):* CCr 41-70 ml/min, 500 mg q8hr; CCr 21-40 ml/min, 250 mg q6hr; CCr 6-20 ml/min, 250 mg q12hr

Available forms: Powder for sol inj 250, 500 mg; powder for susp 500 mg

Administer:

• After C&S is taken

IM route

• Reconstitute 500 mg/2 ml lidocaine without EPINEPHrine; shake

• Inject deeply in large muscle, aspirate, **product for IM is not for IV use**

IV route

• After reconstitution of 250 or 500 mg with 10 ml of diluent and shake; add to ≥100 ml of same inf sol

• 250-500 mg over 20-30 min; ≥750 mg over 40-60 min; give through Y-tube or 3-way stopcock; do not give by IV bolus or if cloudy

Y-site compatibilities: Acyclovir, amifostine, aztreonam, cefepime, cisatracurium, diltiazem, famotidine, fludarabine, foscarnet, granisetron, IDArubicin, insulin (regular), melphalan, methotrexate,

ondansetron, propofol, remifentanil, tacrolimus, teniposide, thiotepa, vinorelbine, zidovudine

SIDE EFFECTS

CNS: Fever, somnolence, seizures, confusion, dizziness, weakness, myoclonus
CV: Hypotension, palpitations, tachycardia
GI: *Diarrhea, nausea, vomiting,* pseudomembranous colitis, hepatitis, glossitis
GU: Renal toxicity/failure
HEMA: Eosinophilia, neutropenia, decreased Hgb, Hct
INTEG: Rash, urticaria, pruritus, pain at inj site, phlebitis, erythema at inj site
RESP: Chest discomfort, dyspnea, hyperventilation
SYST: Anaphylaxis, Stevens-Johnson syndrome

PHARMACOKINETICS

IV: Onset immediate, peak ½-1 hr, half-life 1 hr, 70%-80% excreted unchanged in urine

INTERACTIONS

Increase: imipenem plasma levels—probenecid
Increase: antagonistic effect—β-lactam antibiotics
Increase: seizure risk—ganciclovir, theophylline, aminophylline, cycloSPORINE
Decrease: effect of valproic acid
Drug/Lab Test
Increase: AST, ALT, LDH, BUN, alk phos, bilirubin, creatinine
False positive: direct Coombs' test

NURSING CONSIDERATIONS

Assess:
• Renal studies: creatinine/BUN
• **Infection:** increased temp, WBC, characteristics of wounds, sputum, urine or stool culture
• Sensitivity to penicillin—may have sensitivity to this product
• Renal disease: lower dose may be required
• Bowel pattern daily; if severe diarrhea occurs, product should be discontinued; may indicate pseudomembranous colitis
⚠ **Allergic reactions, anaphylaxis:** rash, urticaria, pruritus, wheezing, laryngeal edema; may occur a few days after therapy begins; have epinephrine, antihistamine, emergency equipment available
• **Overgrowth of infection:** perineal itching, fever, malaise, redness, pain, swelling, drainage, rash, diarrhea, change in cough, sputum
Evaluate:
• Therapeutic response: negative C&S; absence of signs and symptoms of infection
Teach patient/family:
⚠ To report severe diarrhea; may indicate pseudomembranous colitis
⚠ To report sore throat, bruising, bleeding, joint pain; may indicate blood dyscrasias (rare)

TREATMENT OF ANAPHYLAXIS: EPINEPHrine, antihistamines; resuscitate if needed

imipramine (Rx)

(im-ip'ra-meen)
Tofranil, Tofranil PM
Func. class.: Antidepressant, tricyclic
Chem. class.: Dibenzazepine, tertiary amine

Do not confuse:
imipramine/desipramine

ACTION: Blocks reuptake of norepinephrine, serotonin into nerve endings, thereby increasing action of norepinephrine, serotonin in nerve cells

USES: Depression, enuresis in children
Unlabeled uses: Chronic pain, migraine headaches, cluster headaches as adjunct, incontinence, ADHD, neuralgia, bulimia, neuropathic pain, social phobia

CONTRAINDICATIONS:

Pregnancy (D), hypersensitivity to tricyclics, AV block, bundle branch block, ileus, QT prolongation, acute MI

Precautions: Breastfeeding, geriatric patients, suicidal patients, severe depression, increased intraocular pressure, closed-angle glaucoma, urinary retention, cardiac/hepatic disease, hyperthyroidism, electroshock therapy, elective surgery, seizure disorders, prostatic hypertrophy, MI

Black Box Warning: Children other than for enuresis; suicidal ideation

DOSAGE AND ROUTES

Depression

- **Adult: PO** 75-100 mg/day in divided doses, may increase by 25-50 mg to 200 mg/day (outpatients), 300 mg/day (inpatients); may give daily dose at bedtime
- **Geriatric: PO** 25-50 mg at bedtime, may increase to 100 mg/day in divided doses
- **Child ≥6 yr (unlabeled): PO** 1.5 mg/kg/day in divided doses, max 2.5 mg/kg/day

Enuresis

- **Child 6-12 yr: PO** 10-25 mg at bedtime, max 50 mg

Neuropathic pain (unlabeled)

- **Adult: PO** 10-150 mg/day

Social phobia/panic disorder (unlabeled)

- **Adult: PO** 10 mg at bedtime, titrate q2-4days to 100-200 mg/day

Overactive bladder (OAB) (unlabeled)

- **Adult: PO** 10-50 mg daily, may titrate to 150 mg/day

Available forms: Tabs 10, 25, 50 mg; caps 75, 100, 125, 150 mg

Administer:

PO route

- Not to break, crush, or chew caps
- With food or milk for GI symptoms
- Dosage at bedtime if oversedation occurs during day; may take entire dose at bedtime; geriatric patients may not tolerate once daily dosing
- Sugarless gum, hard candy, or frequent sips of water for dry mouth

SIDE EFFECTS

CNS: *Dizziness, drowsiness,* confusion, seizures, headache, anxiety, tremors, stimulation, weakness, insomnia, nightmares, EPS (geriatric patients), increased psychiatric symptoms, paresthesia

CV: *Orthostatic hypotension, ECG changes, tachycardia,* hypertension, palpitations, dysrhythmias

EENT: Blurred vision, tinnitus, mydriasis

GI: *Diarrhea, dry mouth,* nausea, vomiting, paralytic ileus; increased appetite, cramps, epigastric distress, jaundice, hepatitis, stomatitis, constipation, taste change

GU: *Retention,* acute renal failure

HEMA: Agranulocytosis, thrombocytopenia, eosinophilia, leukopenia

INTEG: Rash, urticaria, sweating, pruritus, photosensitivity; hyperpigmentation (rare)

PHARMACOKINETICS

Steady state 2-5 days; metabolized to desipramine by liver; excreted in urine, breast milk, feces; crosses placenta; half-life 6-20 hr

INTERACTIONS

Hyperpyretic crisis, seizures, hypertensive episode: MAOIs, cloNIDine

Increase: serotonin syndrome, neuroleptic malignant syndrome—SSRIs, SNRIs, serotonin-receptor agonists; avoid concurrent use, linezolid, methylene blue IV

Increase: QT interval—class IA/III antidysrhythmics, tricyclics, gatifloxacin, levofloxacin, moxifloxacin, ziprasidone

Increase: effects of direct-acting sympathomimetics (EPINEPHrine), alcohol, barbiturates, benzodiazepines, CNS depressants

Decrease: effects of guanethidine, cloNIDine, indirect-acting sympathomimetics (ePHEDrine)

Drug/Herb
Increase: serotonin syndrome—SAM-e, St. John's wort
Drug/Lab Test
Increase: serum bilirubin, alk phos, blood glucose
Decrease: 5-HIAA, VMA, urinary catecholamines

NURSING CONSIDERATIONS

Assess:
• B/P (lying, standing), pulse q4hr; if systolic B/P drops 20 mm Hg, hold product, notify prescriber; take vital signs q4hr in patients with CV disease
• Blood studies: CBC, leukocytes, differential, cardiac enzymes, serum imipramine levels (125-250 ng/ml) if patient is receiving long-term therapy
• Hepatic studies: AST, ALT, bilirubin
• Weight weekly; appetite may increase with product
⚠ **QT prolongation:** ECG for flattening of T wave, bundle branch block, AV block, dysrhythmias in cardiac patients
• EPS primarily in geriatric patients: rigidity, dystonia, akathisia
• Mental status: mood, sensorium, affect, suicidal tendencies; increase in psychiatric symptoms: depression, panic
• Urinary retention, constipation; constipation is more likely to occur in children, geriatric patients; increase fluids, bulk in diet
⚠ **Withdrawal symptoms:** headache, nausea, vomiting, muscle pain, weakness, diarrhea, insomnia, restlessness; not usual unless product is discontinued abruptly
• Serotonin syndrome, hypertensive episodes, identify drug interactions before use of product
• Alcohol consumption; if alcohol is consumed, hold dose until morning

Perform/provide:
• Storage in tight container at room temp; do not freeze
• Assistance with ambulation during beginning therapy because drowsiness, dizziness, orthostatic hypotension occurs
• Safety measures, primarily for geriatric patients

Evaluate:
• Therapeutic response: decreased depression, enuresis, pain

Teach patient/family:
• That therapeutic effects may take 2-3 wk
• That product is dispensed in small amounts because of suicide potential, especially at beginning of therapy
• To use caution when driving, performing other activities requiring alertness because of drowsiness, dizziness, blurred vision
• To report urinary retention immediately
• To avoid alcohol, other CNS depressants during treatment
• Not to discontinue medication abruptly after long-term use; may cause nausea, headache, malaise
• To wear sunscreen or large hat because photosensitivity occurs
• To rise slowly, orthostatic hypotension may occur

TREATMENT OF OVERDOSE:

ECG monitoring; lavage, activated charcoal; administer anticonvulsant

immune globulin IM (IMIG/IGIM) (Rx)

Bay Gam 15%, Flebogamma 5%, Flebogamma DIF 5%, Gammagard, Gamunex 10%, Privigen 10%, Vivaglobin 10%

immune globulin IV (IGIV, IVIG) (Rx)

Bay Gam 15%, Carimune NF, Flebogamma 5%, Flebogamma 10% DIF, Gammagard S/D, Gammagard Liquid 10%, Gammaked, Gammaplex, Gammar-P IV, Gamunex, Iveegam EN, Polygam S/D, Privigen, Vivaglobin

immune globulin SC (SCIG/IGSC)

Bay Gam 15%, Flebogamma 5%, Flebogamma DIF 5%, Gammagard 10%, Gammaked, Gammaplex, Gamunex 10%, Privigen 10%, Vivaglobin, Hizentra

Func. class.: Immune serum

Chem. class.: IgG

ACTION: Provides passive immunity to hepatitis A, measles, varicella, rubella, immune globulin deficiency; contains gamma globulin antibodies (IgG)

USES: Immunodeficiency syndrome; B-cell chronic lymphocytic leukemia; Kawasaki syndrome; bone marrow transplantation; pediatric HIV infection; agammaglobulinemia; hepatitis A, B exposure; measles exposure; measles vaccine complications; purpura; rubella exposure; chickenpox exposure; chronic inflammatory demyelinating polyneuropathy

Unlabeled uses: IV posttransfusion purpura, Guillain-Barré syndrome, refractory pemphigus vulgaris, West Nile virus, meningitis, myasthenia gravis thrombocytopenia encephalitis, HIV, cytomegalovirus, neonatal jaundice, RSV infection, primary humoral immunodeficiency, refractory pemphigus vulgaris

CONTRAINDICATIONS: Coagulopathy, hemophilia, IgA deficiency, thrombocytopenia

Precautions: Pregnancy (C), breastfeeding, children, agammaglobulinemia, bleeding, hypogammaglobulinemia, infection, IV, viral infection

DOSAGE AND ROUTES

Immune globulin IM (IMIG, IGIM)

Hepatitis A prophylaxis

- **Adult/geriatric/adolescent/child/infant (unlabeled): IM** 0.02 ml/kg for those who have not received hepatitis A vaccine and been exposed during the prior 2 wk

Measles prophylaxis (exposed during prior 6 days)

- **Adult: IM** 0.25 ml/kg (immunocompetent)
- **Child (unlabeled): IM** 0.5 ml/kg as a single dose, max 15 ml (immunocompromised)

Varicella prophylaxis

- **Adult: IM** 0.6-1.2 ml/kg as soon as possible and if varicella-zoster immune globulin is not available

Rubella prophylaxis in exposed/susceptible individual who will not consider a therapeutic abortion

- **Adult pregnant women: IM** 0.55 ml/kg

Immunoglobulin deficiency

- **Adult: IM** 1.32 ml/kg then 0.66 ml/kg (≥100 mg/kg) q3-4wk

Immune globulin IV (IVIG, IGIV)

Primary immunodeficiency

Gammagard S/D

- **Adult/adolescent/child: IV** 300-600 mg/kg q3-4wk

Polygam S/D

- **Adult/adolescent/child: IV** 100 mg/kg/mo; initially 200-400 mg/kg may be used

Gammar-P IV

• **Adult: IV** 200-400 mg/kg q3-4wk

• **Adolescent/child: IV** 200 mg/kg q3-4wk

Gamunex

• **Adult/adolescent/child: IV INF** 300-600 mg/kg (3-6 ml/kg) q3-4wk, initial inf rate 1 mg/kg/min (max 8 mg/kg/min)

Iveegam EN

• **Adult/adolescent/child: IV** 200 mg/kg monthly, max 800 mg/kg/mo

Panglobulin NF/Carimune NF

• **Adult/adolescent/child: IV** 200 mg/kg/mo

Gamagard liquid/Flebogamma 5%

• **Adult/adolescent/child: IV** 300-600 mg/kg q3-4wk

Privigen

• **Adult/adolescent/child ≥3 yr: IV** 200-800 mg q3wk

Idiopathic thrombocytopenic purpura (ITP)

Panglobulin NF/Carimune NF

• **Adult/child: IV** 400 mg/kg daily × 2-5 days; with acute ITP of childhood, only 2 of 5 days are needed if initial platelets are 30,000-50,000 mcl after 2 doses

Gammagard S/D/Polygam S/D

• **Adult/adolescent/child: IV** 1000 mg/kg as a single dose; may give on alternate days for up to 3 doses

Gamunex

• **Adult/adolescent/child: IV INF** total dose of 2000 mg/kg divided as 1000 mg/kg (10 ml/kg), give on 2 consecutive days; initial rate is 1 mg/kg/min (max 8 mg/kg/min); if after 1st dose adequate platelets are observed after 24 hr, may withhold 2nd dose

Privigen

• **Adult/adolescent ≥15 yr: IV** 1 g/kg/day × 2 days

Kawasaki disease

Iveegam EN

• **Child: IV** 400 mg/kg daily × 4 consecutive days or a single dose of 2000 mg/kg over 10 hr, given with aspirin 100 mg/kg/day through 14th day of illness, then 3-5 mg/kg each day thereafter for 5 wk

Gammagard S/D/Polygam S/D

• **Infant/child: IV** 1000 mg/kg as a single dose or 400 mg/kg/day × 4 days beginning within 7 days of fever onset, with aspirin 80-100 mg/kg/day × 4 divided doses

Immune globulin SC (SCIG/IGSC)

• **Adult/child >2 yr: SUBCUT INF** 100-200 mg/kg q wk, **Vivaglobin** brand of SCIG 160 mg IgG/ml, **SUBCUT** inj 15 ml/inj site, given at max of 20 ml/hr

Hizentra

• **Adult/child:** 1.53 times previous IGIV dose in grams divided by number of wk between IGIV dose, multiply dose in q × 5 for dose in ml, adjust by 1.3 trough before last IGIV treatment, give by subcut infusion weekly

Available forms: IM: Inj 2-, 10-ml vial (Bay Gam); **IV:** 5%, 10% sol (Gamimune N); powder for inj 1-, 3-, 6-, 12-g vials (Carimune NF); 50 mg protein/ml in 2.5-, 5-, 10-g vials (Gammagard S/D); 1-, 2.5-, 5-, 10-g vials (Gammar-P IV); 500 mg, 1-, 2.5-, 5-g vials (Iveegam); 6-, 12-g vials (Panglobulin); 2.5-, 5-, 10-g vials (Polygam S/D); sol for inj 1-, 2.5-, 5-, 10-, 20-g vials (Gamunex); Human sol for inj: Flebogamma 5%, 10% DIF; subcut inj 10, 16, 20% single use

Administer:

• IM ≤3 ml at 1 site; use large muscle mass

• Only with EPINEPHrine 1:1000, resuscitative equipment available

• Only within 2 wk of exposure to hepatitis A

IV route

• **Gamimune N:** IV undiluted or dilute with D_5; give 0.01 ml/kg/min; may increase to 0.02-0.04 ml/kg/min

• **Venoglobulin-I:** (50 mg/ml sol) give 0.01-0.02 ml/kg/min; if no adverse reaction within ½ hr, increase to 0.04 ml/kg/min; store at room temp

• **Gammagard:** reconstitute with sterile water for inj (50 mg protein/ml); give 0.5 ml/kg/hr, may increase to 4 ml/kg/hr; use inf set provided

• **Gammar-IV:** give 0.01 ml/kg/min (50 mg/ml sol) × 15-30 min, may increase to 0.02 ml/kg/min, may increase to 0.03-0.06 ml/kg/min

Y-site compatibilities: Fluconazole, sargramostim

SIDE EFFECTS

CNS: Headache, fatigue, malaise
GI: Abdominal pain
HEMA: Thromboembolism (Vivaglobin)
INTEG: Pain at inj site, rash, pruritus, chills
MS: Arthralgia, chest pain
SYST: Lymphadenopathy, anaphylaxis

INTERACTIONS

• Do not administer live virus vaccines within 3 mo of this product
Drug/Lab Test
Interference: glucose testing system

NURSING CONSIDERATIONS

Assess:
• **Exposure date:** this product should be given within 6 days of measles, 7 days of hepatitis B, 14 days of hepatitis A
• **Anaphylaxis:** diaphoresis, wheezing, chest tightness, hypotension
Perform/provide:
• Storage at 36° F-46° F (2° C-8° C)
Evaluate:
• Prevention of infection, increased platelets
Teach patient/family:
• That passive immunity is temporary
• About the treatment of anaphylaxis: EPINEPHrine, diphenhydrAMINE, oxygen, vasopressors, corticosteroids

indacaterol

(in-da-kat'er-ol)

Arcapta Neohaler

Func. class.: Beta-2 agonist, long acting respiratory

ACTION: An agonist at β-2 receptors. These receptors are present in large numbers in the lungs and are located on bronchiolar smooth muscle. Stimulation of β-2 receptors in the lung causes relaxation of bronchial smooth muscle, which produces bronchodilation and an increase in bronchial airflow. These effects may be mediated, in part, by increased activity of adenyl cyclase, an intracellular enzyme responsible for the formation of cyclic-3′,5′-adenosine monophosphate (cAMP); has >24-fold agonist activity at β-2 receptors (primarily in the lung) compared to β-1 receptors (primarily in the heart)

USES: Bronchitis, chronic obstructive pulmonary disease (COPD), emphysema

CONTRAINDICATIONS: Acute bronchospasm, acute asthma attack, status asthmaticus, acute respiratory insufficiency, monotherapy of asthma, hypersensitivity
Precautions: Ischemic cardiac disease (coronary artery disease), hypertension, cardiac arrhythmias, tachycardia, QT prolongation, congenital long QT syndrome, torsades de pointes history, hyperthyroidism (thyrotoxicosis, thyroid disease), pheochromocytoma, unusual responsiveness to other sympathomimetic amines, seizure disorder, diabetes mellitus, hypokalemia, milk protein hypersensitivity, severe hepatic disease; not indicated for neonates, infants, children, or adolescents under the age of 18 yr, pregnancy (category C), breastfeeding
Black Box Warning: Asthma-related deaths

DOSAGE AND ROUTES

• **Adult: NH** 75 mcg (contents of 1 capsule) inhaled once daily; administer at the same time every day, max 1 dose in 24 hours
Available forms: Powder for inhalation 75 mcg

Administer:

Inhalation route

- For oral inhalation use only. DO NOT swallow the capsules; always use the Neohaler Inhaler; this inhaler should not be used with any other products. Do NOT use with a spacer
- Use dry hands to remove a capsule from the blister pack immediately before use and place into the capsule chamber of the Neohaler Inhaler; click closed; do not place capsule into the mouthpiece; then, holding the inhaler upright, depress buttons fully once to pierce capsule, a click will be heard; have patient breathe out fully away from inhaler, place inhaler in the mouth with buttons positioned to the left and right (not up and down), close lips around mouthpiece, then breathe deeply, rapidly, and steadily in through the inhaler. A whirring sound should be heard; if no sound is heard, check the chamber because the capsule may be stuck. Gently tap the base of the device to loosen capsule, if necessary. After inhalation, patient should hold the breath as long as comfortable while removing inhaler from the mouth; check the chamber to see if any powder remains in the capsule; repeat inhalation steps until no powder remains. Most patients empty the capsule in 1 or 2 inhalations. After administration, open chamber and discard empty capsule
- Advise coughing after administration is not problematic; as long as the capsule is empty the full dose has been administered
- The gelatin capsule might break into small pieces that pass through the inhaler screen and reach the mouth. Accidental inhalation or ingestion of these pieces is harmless; piercing capsule more than once increases risk of shattering capsule. Do not wash inhaler; keep it dry; a clean, dry, lint-free cloth may be used to wipe out the inhaler.
- Use the new inhaler provided with each new prescription
- To avoid the spread of infection, do not share inhaler

SIDE EFFECTS

CNS: Headache, tremor

CV: Sinus tachycardia, hypertension, QT prolongation and ST-T wave changes, prolonged QTc (an increase of >60 ms from baseline), nonsustained ventricular tachycardia, supraventricular tachycardia (SVT) episodes, intermittent ectopic atrial rhythm

ENDO: Hyperglycemia

GI: Nausea, dry mouth (xerostomia)

META: Hypokalemia

MS: Muscle cramps/spasm, musculoskeletal pain

RESP: Paradoxical bronchospasm, cough, dyspnea, sputum purulence or volume, wheezing, nasopharyngitis, pneumonia, sinusitis and upper respiratory tract infection

PHARMACOKINETICS:

Protein binding 94%-96%, approximately 1/3 of total drug-related AUC over 24 hours, a hydroxylated derivative, glucuronate and dealkylate metabolites are present; metabolized by CYP3A4, CYP1A1, CYP2D6, UGT1A1; elimination multiphasic with terminal half-life of 45.5-126 hours; excreted renally (2%-6%), fecally (>90%); onset 5 min, peak 15 min, steady state 12-15 days

INTERACTIONS:

Increase QT prolongation: Class IA/III antiarrhythmics, flecainide, propafenone some antipsychotics (phenothiazines, pimozide, haloperidol risperiDONE, sertindole ziprasidone), amoxapine, arsenic trioxide, astemizole, bepridil, cisapride, citalopram, chloroquine, clarithromycin, dasatinib, dolasetron, dronedarone, droperidol, erythromycin, halofantrine, halogenated anesthetics, levomethadyl, maprotiline, methadone, some quinolones (ofloxacin, gatifloxacin, gemifloxacin, grepafloxacin, levofloxacin, moxifloxacin, sparfloxacin), ondansetron, paliperidone, palonosetron, pentamidine, probucol, propafenone, ranolazine, SUNItinib, terfenadine, thioridazine, tricyclic antidepres-

sants, troleandomycin, vorinostat, tetrabenazine
Increase hypokalemia: Theophylline, aminophylline, corticosteroids
Increase cardiovascular reactions: MAOIs, furazolidone, procarbazine, rasagiline

NURSING CONSIDERATIONS

Assess

Black Box Warning: Asthma-related death; not to be used in asthma

- COPD, emphysema, bronchospasm: monitor pulmonary function tests
- **QT prolongation:** monitor ECG, ejection fraction for QT prolongation
- **Paradoxical bronchospasm:** if paradoxical bronchospasm occurs, discontinue product immediately, use a short-acting β-agonist for rescue therapy, as appropriate

Teach patient/family

- To report dyspnea, wheezing, bronchospasm
- Not to use with other products unless approved by prescriber; there are many interactions

Black Box Warning: Do not use for asthma

indapamide (Rx)

(in-dap'a-mide)
Lozide ♣
Func. class.: Diuretic—thiazide-like, antihypertensive
Chem. class.: Indoline

ACTION: Acts on proximal section of distal renal tubule by inhibiting reabsorption of sodium; may act by direct vasodilation caused by blocking of calcium channels

USES: Edema of CHF, hypertension

CONTRAINDICATIONS: Hypersensitivity to this product or sulfonamides, anuria, hepatic coma, pregnancy (D)
Precautions: Breastfeeding, hypokalemia, dehydration, ascites, hepatic disease, severe renal disease, CCr <30 ml/min (not effective), diabetes mellitus, gout

DOSAGE AND ROUTES

Edema

- **Adult: PO** 2.5 mg/day in AM; may be increased to 5 mg/day if needed after 1 wk

Antihypertensive

- **Adult: PO** 1.25-5 mg/day; may increase to 5 mg/day over 8 wk

Available forms: Tabs 1.25, 2.5 mg
Administer:

- In AM to avoid interference with sleep
- With food if nausea occurs; absorption may be decreased slightly

SIDE EFFECTS

CNS: *Headache,* dizziness, fatigue, weakness, nervousness, agitation, extremity numbness, depression
CV: Orthostatic hypotension, volume depletion, palpitations, dysrhythmias, PVCs, vasculitis
EENT: Blurred vision, nasal congestion, increased intraocular pressure
ELECT: *Hypochloremic alkalosis, hypomagnesemia, hyperuricemia, hypercalcemia, hyponatremia,* hypokalemia, hyperglycemia
GI: *Nausea,* diarrhea, dry mouth, vomiting, anorexia, cramps, constipation, abdominal pain
GU: *Polyuria,* nocturia, urinary frequency, impotence
INTEG: *Rash, pruritus*
MS: Cramps

PHARMACOKINETICS

Well absorbed (PO); widely distributed; metabolized by liver; excreted by kidney (small amounts); onset 1-2 hr; peak 2 hr; duration up to 36 hr; excreted in urine, feces; half-life 14-18 hr

INTERACTIONS

Increase: hyperglycemia—diazoxide
Increase: toxicity of muscle relaxants, steroids, lithium, digoxin
Increase: hypokalemia—corticosteroids, amphotericin B, loop diuretics, thiazide diuretics
Decrease: effects—antidiabetics, antigout agents, anticoagulants
Decrease: absorption—cholestyramine, colestipol
Decrease: hypotensive effect—indomethacin, NSAIDs
Drug/Herb
• Severe photosensitivity: St. John's wort
Drug/Lab Test
Increase: calcium, parathyroid test, glucose, uric acid

NURSING CONSIDERATIONS

Assess:
• Weight, I&O daily to determine fluid loss; effect of product may be decreased if used daily
• Rate, depth, rhythm of respirations, effect of exertion
• B/P lying, standing; postural hypotension may occur
• Electrolytes: potassium, magnesium, sodium, chloride: include BUN, CBC, serum creatinine, blood pH, ABGs, uric acid, Ca, glucose
• Signs of metabolic alkalosis, hypokalemia
• Rashes, fever daily; allergy to sulfa products
• Confusion, especially in geriatric patients; take safety precautions if needed
• Hydration: skin turgor, thirst, dry mucous membranes
Evaluate:
• Therapeutic response: improvement in edema of feet, legs, sacral area daily; decreased B/P
Teach patient/family:
• To consume diet high in potassium; to rise slowly from lying or sitting position
• To recognize adverse reactions: muscle cramps, weakness, nausea, dizziness
• To take with food, milk for GI symptoms; to take early in day to prevent nocturia
• To notify prescriber if urinary output decreases; to monitor daily weight

TREATMENT OF OVERDOSE:

Lavage if taken orally; monitor electrolytes, administer IV fluids; monitor hydration, CV, renal status

indinavir (Rx)

(en-den'a-veer)
Crixivan
Func. class.: Antiretroviral
Chem. class.: Protease inhibitor

Do not confuse: indinavir/Denavir

ACTION:

Inhibits human immunodeficiency virus (HIV-1) protease; this prevents the maturation of the virus

USES:

HIV-1 in combination with at least 2 other antiretrovirals
Unlabeled uses: Prevention of HIV-1 after exposure

CONTRAINDICATIONS:

Hypersensitivity, breastfeeding
Precautions: Pregnancy (C), children, renal/hepatic disease, history of renal stones, diabetes, hypercholesterolemia, hemophilia, autoimmune disease, immune reconstitution syndrome

DOSAGE AND ROUTES

• **Adult: PO** 800 mg q8hr; 400 mg bid with ritonavir 400 mg bid or 800 mg bid with ritonavir 100-200 mg bid; decrease dose to 600 mg bid when given with lopinavir, ritonavir
Mild to moderate hepatic impairment
• **Adult: PO** 600 mg q8h
Available forms: Caps 200, 400 mg

Administer:
- Do not break, crush, or chew caps
- With water, 1 hr before or 2 hr after meals; may be given with other liquids or small meal; do not give with high-fat, high-protein meals
- Dosage adjustment will need to be considered when given with efavirenz
- Increase water to 1.5 L/day minimum to prevent nephrolithiasis

SIDE EFFECTS

CNS: *Headache, insomnia,* dizziness, somnolence
GI: *Diarrhea, abdominal pain, nausea, vomiting,* anorexia, dry mouth
GU: Nephrolithiasis
INTEG: Rash
MS: Pain
OTHER: Asthenia, insulin-resistant hyperglycemia, hyperlipidemia, ketoacidosis, lipodystrophy

PHARMACOKINETICS

Terminal half-life 2 hr; 60% protein binding; metabolized liver; excreted <20% unchanged in urine, 83% in feces

INTERACTIONS

⚠ Life-threatening dysrhythmias: ergots, midazolam, rifampin, triazolam, amiodarone, pimozide, alfazosin
Increase: myopathy—statins (atorvastatin, lovastatin, simvastatin)
Increase: indinavir levels—CYP3A4 inhibitors (arepitant, protease inhibitors, azole antifungals, nefazodone, verapamil); phosphodiesterase-5 inhibitors (sildenafil, tadalafil, vardenafil)
Increase: levels of both products—clarithromycin, zidovudine
Increase: levels of isoniazid, oral contraceptives
Decrease: indinavir levels—CYP3A4 inducers (barbiturates, carBAMazepine, nonnucleoside reverse transcriptase inhibitors, phenytoins, rifamycins, modafinil)
Decrease: effect of both products—anticonvulsants
Decrease: effect—CYP3A4 substrates (calcium channel blockers, immunosuppressants, benzodiazepines, azole antifungals, macrolides, SSRIs, statins)

Drug/Herb
Decrease: indinavir levels—St. John's wort; avoid concurrent use

Drug/Food
Decrease: indinavir absorption—grapefruit juice; high-fat, high-protein foods

Drug/Lab Test
Increase: AST, ALT, amylase, total bilirubin

NURSING CONSIDERATIONS

Assess:
- Complaints of lower back, flank pain; indicates kidney stones
- Signs of infection, anemia, presence of other sexually transmitted diseases
- Blood/hepatic studies: ALT, AST; total bilirubin, amylase, blood glucose, serum cholesterol/lipid profile, may be elevated
- Plasma HIV RNA, viral load, CD4 during treatment
- Bowel pattern before, during treatment; if severe abdominal pain with bleeding occurs, product should be discontinued; monitor hydration
- Skin eruptions; rash, urticaria, itching
- Allergies before treatment, reaction of each medication; place allergies on chart

Teach patient/family:
- To take as prescribed; if dose is missed, to take as soon as remembered up to 1 hr before next dose; not to double dose
- That product must be taken in equal intervals around the clock to maintain blood levels for duration of therapy
- ⚠ That hyperglycemia may occur; to watch for increased thirst, weight loss, hunger, and dry, itchy skin; to notify prescriber
- To increase fluids to prevent kidney stones; if stone formation occurs, that treatment may need to be interrupted
- That product does not cure AIDS, only controls symptoms; not to donate blood

Indomethacin (Rx)

(in-doe-meth'a-sin)

Indocin, Nu-Indo ✤

Func. class.: Nonsteroidal antiinflammatory product (NSAID), antirheumatic

Chem. class.: Acetic acid derivative

Do not confuse:
Indocin/Endocet/minocin/Vicodin

ACTION: Inhibits prostaglandin synthesis by decreasing enzyme needed for biosynthesis; analgesic, antiinflammatory, antipyretic

USES: RA, ankylosing spondylitis, osteoarthritis, bursitis, tendinitis, acute gouty arthritis; closure of patent ductus arteriosus in premature infants (IV)
Unlabeled uses: Bone pain, headache, heterotopic ossification, juvenile rheumatoid arthritis, pericarditis

CONTRAINDICATIONS: Pregnancy (D) 3rd trimester, neonates, aortic coarctation, bleeding salicylate/NSAID hypersensitivity, ulcer disease

Black Box Warning: Perioperative pain in CABG

Precautions: Pregnancy (B) 1st trimester, breastfeeding, children, bleeding disorders, GI disorders, cardiac disorders, depression, renal/hepatic disease, asthma, diabetes, acute bronchospasm, ulcerative colitis, seizures, Parkinson's disease

Black Box Warning: Stroke, GI bleeding, MI

DOSAGE AND ROUTES

Arthritis/antiinflammatory
- **Adult: PO** 25-50 mg bid-tid; max 200 mg/day; **EXT REL** 75 mg/day, may increase to 75 mg bid

Acute gouty arthritis
- **Adult: PO** 50 mg tid; use only for acute attack then reduce dose

Patent ductus arteriosus
Longer or repeated treatment courses may be necessary for very premature infants
- **Infant <2 days: IV** 0.2 mg/kg then 0.1 mg/kg × 2 doses after 12, 24 hr
- **Infant 2-7 days: IV** 0.2 mg/kg then 0.2 mg/kg × 2 doses after 12, 24 hr
- **Infant >7 days: IV** 0.2 mg/kg then 0.25 mg/kg × 2 doses after 12, 24 hr

Available forms: Caps 25, 50 mg; ext rel caps 75 mg; inj 1-mg vial; supp 50 mg; oral susp 5 mg/ml

Administer:

PO route
- Do not break, crush, or chew sus rel cap or reg caps
- With food to decrease GI symptoms and prevent ulcerations
- Shake susp; do not mix with other liquids

IV route
- After reconstituting 1-2 mg/ml or more NS or sterile water for inj without preservative; infuse over 20-30 min, avoid extravasation; do not inj/inf via umbilical catheter to avoid dramatic shift in cerebral blood flow

Y-site compatibilities: Furosemide, insulin (regular), potassium chloride, sodium bicarbonate, sodium nitroprusside

SIDE EFFECTS

CNS: Dizziness, drowsiness, fatigue, tremors, confusion, insomnia, anxiety, depression, *headache*

CV: Tachycardia, peripheral edema, palpitations, dysrhythmias, hypertension, CV thrombotic events, MI, stroke

EENT: Tinnitus, hearing loss, blurred vision

GI: *Nausea,* anorexia, *vomiting,* diarrhea, jaundice, cholestatic hepatitis, *constipation,* flatulence, cramps, dry mouth, peptic ulcer, ulceration, perforation, GI bleeding

GU: Nephrotoxicity: dysuria, hematuria, oliguria, azotemia

HEMA: Blood dyscrasias, prolonged bleeding
INTEG: Purpura, rash, pruritus, sweating

PHARMACOKINETICS

PO: Onset 1-2 hr; peak 3 hr; duration 4-6 hr; metabolized in liver, kidneys; excreted in urine 60%, feces 33%; crosses placenta; excreted in breast milk; 99% protein binding; half-life 1 hr 1st pass, 2.6-11.2 hr 2nd pass

INTERACTIONS

Increase: hyperkalemia—potassium-sparing diuretics
Increase: toxicity—lithium, methotrexate, cycloSPORINE, zidovudine, probenecid
Increase: effect of—digoxin, penicillamine, phenytoin, aminoglycosides
Increase: bleeding risk—anticoagulants, abciximab, cefamandole, cefoperazone, cefoTEtan, clopidogrel, eptifibatide, plicamycin, ticlopidine, tirofiban, valproic acid, thrombolytics, aspirin, SSRIs, SNRIs
Decrease: effect of—antihypertensives

NURSING CONSIDERATIONS

Assess:

• **Arthritis symptoms:** ROM, pain, swelling before and 2 hr after treatment

Black Box Warning: Cardiac disease, CV, thrombotic events (MI, stroke) before administration, not to be used in perioperative pain in CABG surgery

• Patent ductus arteriosus: respiratory rate, character, heart sounds
• Renal, hepatic, blood studies: BUN, creatinine, AST, ALT, Hgb before treatment, periodically thereafter; if renal function has decreased, do not give subsequent doses
• Eye/ear problems: blurred vision, tinnitus; may indicate toxicity; audiometric, ophthalmic exam before, during, after treatment if patient receiving long-term therapy
• Confusion, mood changes, hallucinations, especially among geriatric patients
• Asthma, nasal polyps, aspirin sensitivity, may develop hypersensitivity to indomethacin

Black Box Warning: GI bleeding/perforation: chronic use can lead to GI bleeding, use cautiously in those with a history of active GI disease

Black Box Warning: MI, stroke: may be greater with longer-term use and those with CV risk factors

Perform/provide:

• Storage at room temp

Evaluate:

• Therapeutic response: decreased pain, stiffness, swelling in joints; ability to move more easily

Teach patient/family:

• To report blurred vision, ringing, roaring in ears; may indicate toxicity
• To avoid driving, other hazardous activities if dizziness, drowsiness occurs
• To report change in urine pattern, increased weight, edema, increased pain in joints, fever, blood in urine; may indicate nephrotoxicity
• To report mood changes: anxiety, depression
• That therapeutic antiinflammatory effects may take up to 1 mo
• To avoid alcohol, NSAIDs, salicylates because bleeding may occur
• To report use to all health care providers

inFLIXimab (Rx)

(in-fliks'ih-mab)

Remicade

Func. class.: Biologic response modifiers

Chem. class.: Tumor necrosis factor modifiers

Do not confuse: Remicade/Renacidin/inFLIXimab/riTUXimab

ACTION: Monoclonal antibody that neutralizes the activity of tumor necrosis factor alpha (TNFα) found in Crohn's

disease; decreased infiltration of inflammatory cells

USES: Crohn's disease, fistulizing (moderate to severe); RA, given with methotrexate; plaque psoriasis, ankylosing spondylitis, ulcerative colitis, psoriasis

Unlabeled uses: Psoriatic arthritis, Behçet's syndrome, uveitis, juvenile arthritis

CONTRAINDICATIONS: Hypersensitivity to murines, moderate to severe CHF (NYHA class III/IV)

Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, COPD, hepatotoxicity, hematologic abnormalities, hepatitis B, Guillain-Barré syndrome, seizures, multiple sclerosis

Black Box Warning: Infection, neoplastic disease, TB

DOSAGE AND ROUTES

Crohn's disease (moderate to severe)/(fistulizing)

- **Adult/adolescent/child ≥6 yr: IV INF** 5 mg/kg initially then at 2 wk, 6 wk, q8wk thereafter; may increase to 10 mg/kg/dose if needed (adults)

Rheumatoid arthritis

- **Adult: IV** 3 mg/kg initially then at 2 wk, 6 wk, q8wk thereafter; max 10 mg/kg/dose

Available forms: Powder for inj 100 mg

Administer:

Intermittent IV INF route

- Pretreat with diphenhydrAMINE, acetaminophen, predniSONE if a reaction is inf related
- Give immediately after reconstitution; reconstitute each vial with 10 ml sterile water for inj; further dilute total dose/250 ml of 0.9% NaCl inj to a total conc of 0.4–4 mg/ml; use 21G or smaller needle for reconstitution; direct sterile water at glass wall of vial; gently swirl; do not shake; may foam; allow to stand for 5 min, give within 3 hr
- Give over ≥2 hr, use polyethylene-lined inf with in-line, sterile, low-protein-bind filter
- Do not admix

SIDE EFFECTS

CNS: *Headache, dizziness, depression, vertigo, fatigue, anxiety, fever,* seizures, *chills, flulike symptoms,* demyelinating disease

CV: Chest pain, hypo/hypertension, tachycardia, CHF, acute coronary syndrome

GI: *Nausea, vomiting, abdominal pain, stomatitis, constipation, dyspepsia, flatulence*

GU: Dysuria, urinary frequency

HEMA: Anemia, leukopenia, thrombocytopenia, pancytopenia

INTEG: *Rash, dermatitis, urticaria,* dry skin, sweating, flushing, hematoma, pruritus, keratoderma blenorrhagicum

MS: Myalgia, back pain, arthralgia

RESP: URI, pharyngitis, bronchitis, cough, dyspnea, sinusitis

SYST: Anaphylaxis, fatal infections, sepsis, malignancies, immunogenicity, Stevens-Johnson syndrome, toxic epidermal necrolysis

PHARMACOKINETICS

Distributed to vascular compartment, half-life 9.5 days

INTERACTIONS

Increase: infections neutropenia—TNF blockers (abatacept, anakinra, golimumab, rilonacept), avoid concurrent use

- Do not administer live vaccines concurrently

NURSING CONSIDERATIONS

Assess:

- For RA, ROM, pain
- GI symptoms: nausea, vomiting, abdominal pain
- Periodic blood counts (CBC), ANA titer, LFTs
- CV status: B/P, pulse, chest pain

Allergic reaction, anaphylaxis: rash, dermatitis, urticaria, dyspnea, hypotension, fever, chills; discontinue if severe, administer EPINEPHrine, corticosteroids, antihistamines; assess for allergies to murine proteins before starting therapy

Black Box Warning: Fatal infections: discontinue if infection occurs, do not administer to patients with active infection; identify TB before beginning treatment; a TB test should be obtained; if present, TB should be treated before patient receives product; exercise caution when switching from 1 DMARD to another

- Report suspected adverse reactions to the FDA (1-800-FDA-1088)

Black Box Warning: For neoplastic disease in those <18 yr, including hepatosplenic T-cell lymphoma, usually occurs in those with inflammatory bowel disease

Perform/provide:
- Refrigerated storage, do not freeze

Evaluate:
- Therapeutic response: absence of fever, mucus in stools

Teach patient/family:
- Infusion reaction should be reported immediately
- If infection occurs, notify prescriber immediately
- Not to breastfeed while taking this product
- To notify prescriber of GI symptoms, hypersensitivity reactions, heart symptoms
- Not to operate machinery, drive if dizziness, vertigo occur
- To avoid live virus vaccinations, bring up to date before use

HIGH ALERT

INSULINS

Rapid Acting

insulin glulisine (Rx)
Apidra, Apidra SoloStar

insulin aspart (Rx)
NovoLOG, NovoLOG Flexpen, NovoLOG Pen Fill, NovoMix 30 ♣, Novo Rapid ♣

insulin lispro (Rx)
Humalog

Short Acting

insulin, regular (OTC)
Humulin R, NovoLIN R, ReliOn R

insulin, regular concentrated (Rx)
Humulin R U-500

Intermediate Acting

insulin, isophane suspension (NPH) (OTC)
Humulin N, NovoLIN ge NPH ♣, NovoLIN N, NovoLIN N Prefilled, ReliOn N

Long Acting

insulin detemir (Rx)
Levemir

insulin glargine (Rx)
Lantus

Mixtures

insulin, isophane suspension and regular insulin (Rx)
Humulin 70/30, Humulin 30/70 ♣, NovoLIN 70/30 Prefilled, ReliOn 70/30

isophane insulin suspension (NPH) and insulin mixtures (Rx)

Humulin 50/50

insulin lispro mixture (Rx)

Humalog KwikPen Mix 50/50, Humalog Mix 25 ✤, Humalog Mix 50 ✤, Humalog Mix 75/25, Humalog Mix 50/50

insulin aspart mixture (Rx)

NovoLOG 70/30, NovoLOG Mix Flexpen Prefilled Syringe 70/30

Func.class.: Antidiabetic, pancreatic hormone

Chem. class.: Modified structures of endogenous human insulin

Do not confuse:
Lantus/lente
NovoLIN 70/30 PenFill/NovoLIN 70/30 Prefilled

ACTION: Decreases blood glucose; by transport of glucose into cells and the conversion of glucose to glycogen, indirectly increases blood pyruvate and lactate, decreases phosphate and potassium; insulin may be human (processed by recombinant DNA technologies)

USES: Type 1 diabetes mellitus, type 2 diabetes mellitus, gestational diabetes; insulin lispro may be used in combination with sulfonylureas in children >3 yr

CONTRAINDICATIONS: Hypersensitivity to protamine; creosol (aspart)
Precautions: Pregnancy (B) lispro, detemir, regular aspart; (C) all others

DOSAGE AND ROUTES

Insulin glulisine
• **Adult/adolescent/child ≥4 yr: SUBCUT** dosage individualized, give within 15 min before or 20 min after starting a meal; **Adult: IV** dilute to 1 unit/ml in inf systems with 0.9% NaCl, use PVC Viaflex inf bags and PVC tubing, use dedicated line

Insulin aspart
• **Adult/adolescent/child ≥6 yr: INTERMITTENT SUBCUT** Total daily dose is given as 2-4 inj/day just before beginning of meal; in general, 50%-70% of total daily insulin may be given as insulin aspart, remainder should be intermediate-or long-acting insulin; **CONTINUOUS SUBCUT** used with external insulin pump via cont SUBCUT insulin inf (CSII), insulin dose should be based on insulin dose from previous regimen

Insulin lispro
• **Adult/adolescent/child ≥3 yr: SUBCUT** 15 min before meals; **CONT SUBCUT INF (external insulin pump):** total daily dose should be based on insulin dose from previous regimen, 50% of total dose can be given as meal-related boluses, remainder as basal inf

Human regular
• **Adult: SUBCUT** 1/2-1 hr before meals

Insulin, isophane suspension
• **Adult: SUBCUT** dosage individualized by blood, urine glucose; usual dose 7-26 units; may increase by 2-10 units/day if needed

Insulin detemir
• **Adult/adolescent/child ≥2 yr: SUBCUT** 1-2×/day; if 1×, give with evening meal

Insulin glargine
• **Adult and child ≥6 yr: SUBCUT** 10 international units/day, range 2-100 international units/day

Regular insulin (ketoacidosis)
• **Adult: IV** 5-10 units, then 5-10 units/hr until desired response, then switch to **SUBCUT** dose; **IV/INF** 2-12 units (50 units/500 ml of normal saline)
• **Child: IV** 0.1 units/kg

Replacement
• **Adult and child: SUBCUT** 0.5-1 units/kg/day qid given 30 min before meals

• **Adolescent: SUBCUT** 0.8-1.2 mg/kg/day; this dosage is used during rapid growth

Available forms: ***NPH*** Inj 100 units/ml; ***regular*** inj 100 units/ml, cartridges 100 units/ml; ***insulin analog*** inj 100 units/ml; ***isophane insulin*** inj 100 units/ml, cartridges 100 units/ml; ***insulin lispro*** 100 units/ml, 1.5-ml cartridges, ***insulin lispro*** Humalog Pen sol for inj 100 units/ml; ***insulin glulisine*** inj 100 units/ml; ***insulin glargine*** inj 100 units/ml; ***insulin detemir*** inj 100 units/ml in 10 vials, 3-ml cartridges; ***insulin aspart*** inj 100 mg/ml (Flexpen, Pen Fill)

Administer:

SUBCUT route

• After warming to room temp by rotating in palms to prevent injecting cold insulin; use only insulin syringes with markings or syringe matching units/ml; rotate inj sites within one area: abdomen, upper back, thighs, upper arm, buttocks; keep record of sites

• Increased dosages if tolerance occurs

• Premixed insulins, NPH are cloudy suspensions

• Regular human insulin, rapid-acting analogs, long-acting analogs are clear; do not use if cloudy, thick, or discolored

CONT SUBCUT route (insulin infusion CSII)

• Do not mix with other insulins when using a pump

• Insulin lispro 3-ml cartridges to be used in Disetronic H-TRON plus V100 pump using Disetronic rapid inf sets; inf set and cartridge adapter should be changed q3days; replace 3-ml cartridge q6days

IV route (insulin glulisine only)

• Dilute to 1 international unit/ml in inf systems with 0.9% NaCl using PVC viaflex inf bags and PVC tubing; use dedicated line; do not admix

IV route (regular only)

⚠ When regular insulin is administered IV, monitor glucose, potassium often to prevent fatal hypoglycemia, hypokalemia

• IV direct, undiluted via vein, Y-site, 3-way stopcock; give at ≤50 units/min

• By cont inf after diluting with IV sol and run at prescribed rate; use IV inf pump for correct dosing; give reduced dose at serum glucose level of 250 mg/100 ml

Additive compatibilities: Cimetidine, lidocaine, meropenem, ranitidine, verapamil

Y-site compatibilities: Amiodarone, ampicillin, ampicillin/sulbactam, aztreonam, ceFAZolin, cefoTEtan, DOBUTamine, esmolol, famotidine, gentamicin, heparin, heparin/hydrocortisone, imipenem/ cilastatin, indomethacin, magnesium sulfate, meperidine, meropenem, midazolam, morphine, nitroglycerin, oxytocin, PENTobarbital, potassium chloride, propofol, ritodrine, sodium bicarbonate, sodium nitroprusside, tacrolimus, terbutaline, ticarcillin, ticarcillin/clavulanate, tobramycin, vancomycin, vit B/C

SIDE EFFECTS

EENT: Blurred vision, dry mouth

INTEG: Flushing, rash, urticaria, warmth, lipodystrophy, lipohypertrophy, swelling, redness

META: *Hypoglycemia,* rebound hyperglycemia (Somogyi effect 12-72 hr or longer)

MISC: Peripheral edema

SYST: Anaphylaxis

PHARMACOKINETICS

Rapid acting

Insulin glulisine: Onset 15-30 min, peak ½-1½ hr, duration 3-4 hr

Insulin aspart: Onset 10-20 min, peak 1-3 hr, duration 3-5 hr

Insulin lispro: Onset 15-30 min, peak ½-1½ hr, duration 3-5 hr

Short acting

Insulin regular: Onset 30 min, peak 2.5-5 hr, duration up to 7 hr

Intermediate acting

Insulin, isophane suspension (NPH): Onset 1.5-4 hr, peak 4-12 hr, duration ≤24 hr

Long acting

Insulin detemir: Onset 0.8-2 hr, peak unknown, duration ≤24 hr (conc dependent)

Insulin glargine: Onset 1.5 hr, no peak identified, duration ≥24 hr

Mixtures

Insulin, isophane suspension and regular insulin (70/30): Onset 10-20 min, peak 2.4 hr, duration ≤24 hr

Insophane insulin suspension (NPH) and insulin mixtures (50/50): Onset ½-1 hr, peak dual, duration 10-16 hr

INTERACTIONS

Increase: hypoglycemia—salicylate, alcohol, β-blockers, anabolic steroids, fenfluramine, phenylbutazone, sulfinpyrazone, guanethidine, oral hypoglycemics, MAOIs, tetracycline

Decrease: hypoglycemia—thiazides, thyroid hormones, oral contraceptives, corticosteroids, estrogens, DOBUTamine, EPINEPHrine

Drug/Lab Test

Increase: VMA

Decrease: potassium, calcium

Interference: LFTs, thyroid function studies

NURSING CONSIDERATIONS

Assess:

- Fasting blood glucose; A1c may be drawn to identify treatment effectiveness q3mo
- Urine ketones during illness; insulin requirements may increase during stress, illness, surgery
- Hypoglycemic reaction that can occur during peak time (sweating, weakness, dizziness, chills, confusion, headache, nausea, rapid weak pulse, fatigue, tachycardia, memory lapses, slurred speech, staggering gait, anxiety, tremors, hunger)
- **Hyperglycemia:** acetone breath; polyuria; fatigue; polydipsia; flushed, dry skin; lethargy

Perform/provide:

- Store at room temp for <1 mo (some insulins); keep away from heat and sunlight; refrigerate all other supply; NPH, premixed insulins are cloudy; regular, rapid-acting analogs, long-acting analogs are clear; do not freeze—IV route, regular only

Evaluate:

- Therapeutic response: decrease in polyuria, polydipsia, polyphagia; clear sensorium; absence of dizziness; stable gait

Teach patient/family:

- That blurred vision occurs; not to change corrective lens until vision is stabilized after 1-2 mo
- To keep insulin, equipment available at all times; to carry a glucagon kit, candy, or lump of sugar to treat hypoglycemia
- That product does not cure diabetes but controls symptoms
- To carry emergency ID as diabetic
- To recognize hypoglycemia reaction: headache, tremors, fatigue, weakness
- To recognize hyperglycemia reaction: frequent urination, thirst, fatigue, hunger
- About the dosage, route, mixing instructions, diet restrictions (if any), disease process
- About the symptoms of **ketoacidosis:** nausea; thirst; polyuria; dry mouth; decreased B/P; dry, flushed skin; acetone breath; drowsiness; Kussmaul respirations
- That a plan is necessary for diet, exercise; that all food on diet should be eaten; that exercise routine should not vary
- About blood glucose testing; how to determine glucose level
- To avoid OTC products unless directed by prescriber

TREATMENT OF OVERDOSE:

Glucose 25 g IV, via dextrose 50% sol, 50 ml or glucagon 1 mg

interferon alfacon-1 (Rx)

(in-ter-feer'on al'fa-kon)

Infergen

Func. class.: Recombinant type 1 interferon

ACTION: Induces biologic responses and has antiviral, antiproliferative, and immunomodulatory effects

USES: Chronic hepatitis C infections in those ≥18 yr with compensated liver disease who have anti-HCV antibodies or HCV RNA, may use in combination with ribavirin

Unlabeled uses: Hairy-cell leukemia when used with G-CSF

CONTRAINDICATIONS: Hypersensitivity to α-interferons or products from *Escherichia coli;* decompensated hepatic disease, autoimmune hepatitis

Precautions: Pregnancy (C), breastfeeding, children <18 yr, geriatric patients, thyroid disorders, myelosuppression, hepatic disease, seizure disorder, alcoholism, hepatitis

Black Box Warning: Cardiac disease, autoimmune disease, infection, depression

DOSAGE AND ROUTES

• **Adult: SUBCUT monotherapy** 9 mcg as single inj 3×/wk × 24 wk; leave ≥48 hr between injections; for patients who did not respond or relapsed after discontinuation, give 15 mcg 3×/wk × 48 wk; **combination: SUBCUT** 15 mcg daily with ribavirin 1000 mg/day PO (<75 kg), 1200 mg/day PO (≥75 kg); give in 2 divided doses for up to 48 wks, use stepwise dose reduction of the interferon dose from 15 mcg to 9 mcg to 6 mcg for serious adverse reactions

Available forms: Inj 9 mcg/0.3 ml, 15 mcg/0.5 ml

Administer:

• Premedicate with acetaminophen or ibuprofen

• Do not shake vial; use 1 dose per vial; discard unused portion; use proper inj sites; rotate sites, discard unused product

• Do not miss doses

SIDE EFFECTS

CNS: Depression, headache, fatigue, fever, rigors, insomnia, dizziness, agitation, nervousness, anxiety, lability, abnormal thinking

CV: Hypertension, palpitation, tachycardia

EENT: Tinnitus, earache, conjunctivitis, eye pain

GI: Abdominal pain, nausea, diarrhea, anorexia, dyspepsia, vomiting, constipation, flatulence, hemorrhoids, decreased salivation

GU: Dysmenorrhea, vaginitis, menstrual disorders

HEMA: Granulocytopenia, thrombocytopenia, leukopenia, ecchymosis, aplastic anemia

INTEG: Alopecia, pruritus, rash, erythema, dry skin

MISC: Anaphylaxis, angioedema, flulike illness

MS: Back, limb, neck skeletal pain; rigors

RESP: Pharyngitis, upper respiratory infection, cough, sinusitis, rhinitis, respiratory tract congestion, epistaxis, dyspnea, bronchitis

PHARMACOKINETICS

Peak 1-4 hr, peak biologic response 24-36 hr

INTERACTIONS

Increase: hearing loss—eflornithine (systemic), consider serial audiograms

Increase: NRTI, use together cautiously

Increase: myelosuppression—myelosuppressives

Increase: toxicity—aldesleukin, IL-2 effornithine, theophylline
Decrease: effect of—antiretrovirals (NNRTs, NRTIs, protease inhibitors)

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Past or present history of depression, seizures; use with caution with these disorders

Black Box Warning: **Hemolytic anemia:** ribavirin may be used with this product and cause hemolytic anemia, cardiac symptoms

- Ophthalmologic status; report periodically
- **Pregnancy:** determine if patient is pregnant before use with ribavirin, pregnancy (X), when used with ribavirin
- CBC, LFTs, ECG, platelet counts, heme concentration, ANC, serum creatinine, albumin, bilirubin, TSH, T_4, triglycerides at baseline and periodically
- Myelosuppression: hold dose if neutrophil count is $<500 \times 10^6$/L or if platelets are $<50 \times 10^9$/L, monitor for infection
- For hypersensitivity: discontinue immediately if hypersensitivity occurs

Evaluate:

- Therapeutic response: decreased chronic hepatitis C signs/symptoms

Teach patient/family:

- With detailed written information about product
- To report signs, symptoms of infection, thyroid/liver dysfunction, changes in behavior
- To report if pregnancy is planned or suspected (C), when combined with ribavirin pregnancy (X)
- To use OTC analgesics to decrease flu-like symptoms
- If patient will be self-administering injection, teach all aspects of product use, administration, disposal, provide medication guide

interferon beta-1a (Rx)

(in-ter-feer'on)

Avonex, Rebif

interferon beta-1b (Rx)

Betaseron, Extavia

Func. class.: Multiple sclerosis agent, immune modifier

Chem. class.: Interferon, *Escherichia coli* derivative

ACTION: Antiviral, immunoregulatory; action not clearly understood; biologic response-modifying properties mediated through specific receptors on cells, inducing expression of interferon-induced gene products

USES: Ambulatory patients with relapsing or remitting MS

Unlabeled uses: May be useful for treatment of AIDS, AIDS-related Kaposi's sarcoma, malignant melanoma, metastatic renal cell carcinoma, cutaneous T-cell lymphoma, acute non-A/non-B hepatitis, chronic hepatitis C

CONTRAINDICATIONS: Hypersensitivity to natural or recombinant interferon-β or human albumin, hamster protein, rotovirus vaccine

Precautions: Pregnancy (C), breastfeeding, children <18 yr, chronic progressive MS, depression, mental disorders, seizure disorder, latex allergy, autoimmune disorders, bone marrow suppression, hepatotoxicity, cardiac disease, alcoholism, chickenpox, herpes zoster

DOSAGE AND ROUTES

Interferon beta-1a

Remitting or relapsing multiple sclerosis

- **Adult: IM** (Avonex) 30 mcg/wk
- **Adult: SUBCUT** (Rebif) 22 or 44 mcg 3×/wk with each dose 48 hr apart, titrate to full dose over 4-wk period

Chronic hepatitis C (unlabeled)
• **Adult: SUBCUT** (Rebif) 44 mcg 3×/wk × 24 wk

Interferon beta-1b

Relapsing or remitting multiple sclerosis
• **Adult: SUBCUT** 0.0625 mg every other day for wk 1 and 2, then 0.125 mg every other day for wk 3 and 4, then 0.1875 mg every other day for wk 5 and 6, then 0.25 mg every other day thereafter; higher doses should not be used

Available forms: *beta-1a:* (Avonex) 30 mcg (6.6 million international units/vial) (autoinjector pen); (Rebif) 22 mcg, 44 mcg/0.5 ml; *beta-1b:* powder for inj 0.3 mg (9.6 m international units) Kit

Administer:

Interferon beta-1a

• Visually inspect parenteral products for particulate matter and discoloration before use

IM route
• Premedicate with acetaminophen or ibuprofen and give at bedtime to lessen flulike symptoms
• Interferon β1a (Avonex) 30 mcg is equivalent to 6 million IU
• If a dose is missed, give it as soon as possible; continue the regular schedule but do not give 2 injections within 2 days of each other; all products are for single-use only; do not reuse needles, syringes, prefilled syringes, or autoinjectors
• Injection sites should be rotated to minimize the likelihood of injection site reactions
• Do not inject into an area of the body where skin is irritated, reddened, bruised, infected, or scarred
• The injection site should be checked after 2 hr for redness, edema, or tenderness
• The manufacturer of Avonex offers free training on IM use for patients and health care partners; contact MS ActiveSource for more information (800-456-2255)

Reconstitution and administration of Avonex lyophilized powder for IM route
• Use appropriate aseptic technique for preparation of solution
• Sites for injection include the thigh or upper arm
• Slowly add 1.1 ml sterile water for injection, USP, preservative-free (supplied by manufacturer) to the vial; rapid addition of the diluent can cause foaming, making it difficult to withdraw the solution
• Gently swirl the vial to aid in dissolution; do not shake; final concentration should be 30 mcg/ml (6 million IU/ml)
• The reconstituted solution should be clear to slightly yellow without particles; discard if the reconstituted product contains particulate matter or is discolored
• Withdraw 1 ml of reconstituted solution into a syringe; attach the sterile needle and inject IM
• A 25-G 1-inch needle for intramuscular injection may be substituted for the 23-G 1¼-inch needle provided by the manufacturer, if needed
• **Storage:** Use within 6 hr of reconstitution; store reconstituted solution in refrigerator; *do not freeze;* discard any unused solution; both drug and diluent vials are single-use only

Administration of Avonex prefilled syringe
• Patients may self-inject only if provider determines that it is appropriate, and with medical follow-up, and after proper training in IM injection technique
• The first injection should be performed under the supervision of an appropriately qualified person
• If self-injecting, rotate injection site between thighs; with help from another person, may rotate injection site between thighs and upper arms
• Wash hands before handling the Dose Pack
• Remove prefilled syringe from the refrigerator to warm to room temperature (usually 30 min before use); do not use external heat sources such as hot water to warm the syringe

• Hold the syringe so the cap is facing down and the 0.5 ml mark is at eye level; be sure the amount of liquid in the syringe is the same or very close to the 0.5 ml mark; if the syringe does not contain the correct amount of liquid, do not use it and call the pharmacist
• Hold syringe upright so that the rubber cap faces up; remove the cap by bending it at a 90 degree angle until it snaps free
• Attach the needle by pressing it onto the syringe and turning it clockwise until it locks in place; be careful not to push the plunger while attaching the needle
• Use the alcohol wipe to clean the skin at the injection site you choose; then, pull the protective cover straight off the needle; do not twist the cover off
• Inject intramuscularly at a 90-degree angle into the thigh or upper arm as directed by the provider
• Use gauze pad to apply pressure for a few seconds after the injection
• Dispose of used needles and syringes in a puncture-resistant container and discard appropriately
• Instruct patients to contact the health care provider if a skin reaction occurs that does not resolve in a few days
• A 25-G 1-inch needle for intramuscular injection may be substituted for the 23-G 1¼-inch needle provided by the manufacturer, if deemed appropriate by the physician
• Refer to the Patient Medication Guide for detailed instructions for preparing and giving a dose
• **Storage:** Store refrigerated; if refrigeration is unavailable, may store at 77° F or less for up to 7 days; after removing from refrigerator, do not store product above 25° C; if the product has been exposed to conditions other than recommended, discard the product; do not expose to high temperatures; do not freeze; protect from light

Administration of Avonex prefilled autoinjector

• Patients may self-inject only if their provider determines that it is appropriate, and with medical follow-up, and after proper training in IM technique
• The first injection should be performed under the supervision of provider
• Remove one Administration Dose Pack from the refrigerator to warm to room temperature (about 30 min before use); do not use external heat sources such as hot water to warm the syringe Dose Pack
• Wash hands before handling Dose Pack contents
• Ensure tamper-evident cap has not been removed or is loose; then grasp the cap and bend it at a 90-degree angle until it snaps off; pull off the sterile foil from the needle cover
• Hold the Avonex Pen with the glass syringe tip pointing up; press the needle onto the glass syringe tip; gently turn the needle clockwise until firmly attached; do not remove plastic cover from the needle
• Hold Pen with one hand and, using other hand, hold onto the injector shield (grooved area) tightly and quickly pull up on the injector shield until the injector shield covers the needle all the way; the plastic needle cover will pop off after the injector shield has been fully extended
• When the injector shield is extended the right way, there will be a small blue rectangular area next to the oval medication display window; check the display window and make sure the Avonex is clear and colorless
• Do not use the injection if the liquid is colored, cloudy, or has lumps or particles; air bubbles will not affect the dose
• Do not push down on the injector shield and the blue activation button at the same time until you are ready to give injection
• Avonex Pen should be injected into the upper outer thigh
• Use the alcohol wipe to clean the skin at the injection site and allow it to dry before injection
• Hold Pen at 90-degree angle to the injection site; firmly push the body of the pen down against the thigh to release the

safety lock; safety lock is released when blue rectangle area above the oval medication display window is gone, push down on blue activation button with thumb and count to 10, you will hear a click if the injection is given the right way
• After counting to 10, pull the Pen straight out of the skin, use gauze pad to apply pressure for a few seconds
• The circular display window on the Pen is yellow if the full dose is received
• Cover exposed needle with Pen cover; do not hold the Pen cover with your hands while inserting the needle
• Dispose of used needles and syringes in a puncture-resistant container and discard appropriately
• Instruct patients to contact the health care provider if a skin reaction occurs that does not resolve in a few days
• Refer to the Patient Medication Guide for detailed instructions for preparing and giving a dose
• **Storage:** Store at 36°–46° F (2°–8° C); if refrigeration is unavailable, may store at 77° F or less for up to 7 days; after removing from refrigerator, do not store product above 25° C; if the product has been exposed to conditions other than recommended, discard the product and do not use; do not expose to high temperatures; do not freeze; protect from light

Subcutaneous administration

• Give at the same time (preferably late in the afternoon or evening) on the same days of the week at least 48 hours apart
• Do not give on two consecutive days; if a dose is missed, administer the dose as soon as possible, then skip the following day; return to the regular schedule the following week
• Premedication with acetaminophen or ibuprofen can lessen the severity of flulike symptoms
• Interferon β1a (Rebif) 44 mcg is equivalent to 12 million IU
• Rotate injection sites; appropriate injection sites include thigh, outer surface of upper arm, stomach, or buttocks; do not inject into an area where the skin is irritated, reddened, bruised, or infected
• A Starter Pack containing a lower dose of Rebif syringes is available for the initial titration period; patients and/or their caregivers should be trained and understand appropriate preparation and administration
• The manufacturer offers complimentary services including injection training and reimbursement support; contact MS LifeLines at 877-44-REBIF

Injection (Rebif)

• Interferon β1a (Rebif) is available in a prefilled syringe with a 29-G needle
• Inject subcutaneously into the outer surface of the upper arm, abdomen, thigh, or buttock do not inject the area near the navel or waistline; take care not to inject intradermally
• Discard any unused solution; prefilled syringes do not contain preservatives and are single-use only

Interferon beta-1b

SUBCUT route

• The manufacturers of Betaseron and of Extavia offer materials to assist with training on subcut use, call 1-800-788-1467 (Betaseron), 1-888-669-6682 (Extavia)
• Premedication with acetaminophen or ibuprofen and use of product at bedtime can lessen the severity of flulike symptoms
• Visually inspect parenteral products for particulate matter and discoloration before use; do not use if particulate matter is present

Reconstitution

• Add 1.2 ml of 0.54% sodium chloride injection (supplied by the manufacturer) to the vial by using the vial adapter to attach the prefilled syringe that contains the diluent; keep the plunger depressed, and gently swirl, do not shake; if you take your thumb off the plunger, the solution can come back into the syringe before the product is fully reconstituted; if foaming occurs, allow the vial to sit until the foam settles; final concentration (250

mcg interferon β1b/ml, which corresponds to 8 million IU/ml)
• If not used immediately, store in the refrigerator for up to 3 hr; do not freeze; discard any unused portion after 3 hr

Injection
• Withdraw the desired amount of the reconstituted solution into the syringe by turning the vial and syringe to get the vial on top; pull the plunger back to get the desired amount of product; turn the syringe to point the needle upward, and tap the syringe and release any air bubbles; twist the vial adapter to remove it and the vial
• Choose an injection site on the upper back arm; abdomen; buttock; or front thigh; do not inject within 2 in of the navel or in a site where the skin is red, bruised, infected, broken, painful, uneven, or scabbed; rotate injection sites to minimize injection site reactions such as necrosis or localized infection
• Inject subcutaneously; take care not to inject intradermally

SIDE EFFECTS

CNS: *Headache, fever, pain, chills, mental changes, depression,* hypertonia, suicide attempts, seizures
CV: *Migraine, palpitations, hypertension,* tachycardia, peripheral vascular disorders
EENT: *Conjunctivitis,* blurred vision
GI: *Diarrhea, constipation, vomiting, abdominal pain*
GU: *Dysmenorrhea, irregular menses, metrorrhagia,* cystitis, breast pain
HEMA: Decreased lymphocytes, ANC, WBC; *lymphadenopathy,* anemia
INTEG: *Sweating, inj site reaction*
MS: *Myalgia,* myasthenia
RESP: *Sinusitis,* dyspnea

PHARMACOKINETICS

β-1a: Onset ≤12 hr, peak 48 hr, duration 4 days, half-life 8.6 hr
β-1b: Onset rapid, peak 2-8 hr, duration unknown, half-life 8 min-4.3 hr

INTERACTIONS

Increase: hepatic damage—antiretrovirals (NNRTIs, NRTIs, protease inhibitors)
Increase: myelosuppression—antineoplastics
Decrease: clearance of zidovudine

Drug/Herb
• Change in immunomodulation: astragalus, echinacea, melatonin

Drug/Lab Test
Interference: vaccines, toxoids; avoid concurrent use
Increase: LFTs

NURSING CONSIDERATIONS

Assess:
• Blood, hepatic studies: CBC, differential, platelet counts, BUN, creatinine ALT, urinalysis; if absolute neutrophil count $<750/mm^3$ or if AST/ALT is 10× normal, discontinue product
• CNS symptoms: headache, fatigue, depression
• GI status: diarrhea or constipation, vomiting, abdominal pain
• Cardiac status: increased B/P, tachycardia
• Mental status: depression, depersonalization, suicidal thoughts, insomnia
• Multiple sclerosis symptoms

Perform/provide:
• Storage in refrigerator; do not freeze

Evaluate:
• Therapeutic response: decreased symptoms of multiple sclerosis

Teach patient/family:
• With written, detailed information about product
• That blurred vision, sweating may occur
• That female patients may experience irregular menses, dysmenorrhea or metrorrhagia, breast pain
• To use sunscreen to prevent photosensitivity
• To notify prescriber if pregnancy is suspected
• About inj technique, care of equipment

• To notify prescriber of increased temp, chills, muscle soreness, fatigue, depression, symptoms of hepatotoxicity

interferon gamma-1b (Rx)

(in-ter-feer'on)

Actimmune

Func. class.: Biologic response modifier

Chem. class.: Lymphokine, interleukin type

ACTION: Species-specific protein synthesized in response to viruses, effects; can mediate killing of *Staphylococcus aureus, Toxoplasma gondii, Leishmania donovani, Listeria monocytogenes, Mycobacterium avium intracellulare;* enhances oxidative metabolism of macrophages, enhances antibody-dependent cellular cytotoxicity

USES: Serious infections associated with chronic granulomatous disease, osteopetrosis

Unlabeled uses: *Mycobacterium avium* complex (MAC), pulmonary fibrosis

CONTRAINDICATIONS: Hypersensitivity to interferon-γ, *Escherichia coli*–derived products

Precautions: Pregnancy (C), breastfeeding, children <1 yr, cardiac disease, seizure disorders, CNS disorders, myelosuppression

DOSAGE AND ROUTES

• **Adult: SUBCUT** 50 mcg/m² (1.5 million units/m²) for patients with surface area >0.5 m²; 1.5 mcg/kg/dose for patients with surface area <0.5 m²; give Monday, Wednesday, Friday for 3×/wk dosing

Available forms: Inj 100 mcg (2 million units)/single-dose vial

Administer:

• At bedtime to minimize adverse reactions; give acetaminophen for fever, headache

• 50% of dose if severe reactions occur or discontinue treatment until reactions subside

• In right and left deltoid and anterior thigh

• Warm to room temp before use; do not leave at room temp >12 hr (unopened vial)

SIDE EFFECTS

CNS: *Headache, fatigue,* depression, fever, chills

GI: *Nausea, anorexia,* abdominal pain, weight loss, diarrhea, vomiting, colitis

HEMA: Leukopenia, thrombocytopenia, neutropenia

INTEG: Rash, pain at inj site, Stevens-Johnson syndrome

MS: Myalgia, arthralgia

PHARMACOKINETICS

SUBCUT: Dose absorbed 89%, elimination half-life 5.9 hr, peak 7 hr

INTERACTIONS

Increase: myelosuppression—other myelosuppressive agents

Increase: level of theophylline, aminophylline

Increase: liver toxicity—protease inhibitors, nucleoside reverse transcriptase inhibitors (NRTIs), nonnucleoside reverse transcriptase inhibitors (NNRTIs)

NURSING CONSIDERATIONS

Assess:

• Blood, renal, hepatic studies: CBC, differential, platelet counts, BUN, creatinine, ALT, urinalysis

• CNS symptoms: headache, fatigue, depression

Perform/provide:

• Storage in refrigerator upon receipt; do not freeze; do not shake

Evaluate:
• Therapeutic response: decreased serious infections; improvement in existing infections and inflammatory conditions
Teach patient/family:
• About the method of administration if family members will be giving medication
• With written, detailed information about product

ipilimumab

(ip-i-lim'ue-mab)

Yervoy

Func. class.: Antineoplastic; biologic response modifier

ACTION: A recombinant, human monoclonal antibody that binds to the cytotoxic T-lymphocyte-associated antigen 4 (CTLA-4); action is indirect, possibly through T-cell–mediated anti-tumor immune responses

USES: Treatment of unresectable or metastatic malignant melanoma

CONTRAINDICATIONS Hypersensitivity
Precautions: Pregnancy, breastfeeding, Crohn's disease, hepatitis, immunosuppression, inflammatory bowel disease, iritis, ocular disease, organ transplant, pancreatitis, renal disease, rheumatoid arthritis, sarcoidosis, systemic lupus erythematosus, thyroid disease, ulcerative colitis, uveitis

Black Box Warning: Adrenal insufficiency, diarrhea, Guillain-Barré syndrome, hepatic disease, myasthenia gravis, hypo/hyperthyroidism, hypopituitarism, peripheral neuropathy, serious rash

DOSAGE AND ROUTES

• **Adult/geriatric: IV** 3 mg/kg over 90 min q3wk × 4 doses; permanently discontinue if the full treatment course is not completed within 16 wk from 1st dose or for severe or life-threatening adverse reactions; withhold a dose for any moderate endocrine or immune-mediated adverse reactions; if the moderate adverse reaction completely or partially resolves (Grade 0-1) and if the patient is receiving <7.5 mg predniSONE or equivalent/day, resume at a dose of 3 mg/kg IV q3wk until all 4 planned doses or 16 wk from 1st dose, whichever occurs earlier; if moderate adverse reactions are persistent or if the corticosteroid dose cannot be reduced to 7.5 mg predniSONE or equivalent/day, permanently discontinue

Available forms: Sol for inj 50 mg/10 ml, 200 mg/40 ml

Administer:

Intermittent IV INF route

• Visually inspect parenteral products for particulate matter and discoloration before using whenever sol and container permit; sol may have a pale yellow color and have translucent to white, amorphous particles; discard the vial if sol is cloudy, if there is pronounced discoloration, or if particulate matter is present
• Allow vials to stand at room temperature for 5 min before inf preparation; withdraw the required volume and transfer into an IV bag; discard partially used vials or empty vials; dilute with 0.9% sodium chloride injection or 5% dextrose injection to a final conc (1-2 mg/ml); mix diluted sol by gentle inversion; do not admix
• Give inf over 90 min through an IV line with a low-protein binding in-line filter, do not give with other products; after each inf, flush the line with 0.9% sodium chloride injection or 0.5% dextrose injection

SIDE EFFECTS

CNS: Severe and fatal immune-mediated neuropathies, fatigue, headache, fever
EENT: Uveitis, iritis, episcleritis
ENDO: Severe and fatal immune-mediated endocrinopathies

GI: Severe and fatal immune-mediated enterocolitis, hepatitis, pancreatitis, abdominal pain, nausea, diarrhea, appetite decreased, vomiting, constipation, colitis
INTEG: Severe and fatal immune-mediated dermatitis pruritus, rash, urticaria
MISC: Cough, dyspnea, anemia, eosinophilia, nephritis
SYST: Antibody formation, Stevens-Johnson syndrome, toxic epidermal necrolysis

PHARMACOKINETICS:

Steady state by 3rd dose; terminal half-life 14.7 days

NURSING CONSIDERATIONS

- **Serious skin disorders: Stevens-Johnson syndrome, toxic epidermal necrolysis:** permanently discontinue in these or rash complicated by full thickness dermal ulceration or necrotic, bullous, or hemorrhagic manifestations like bullous rash; give systemic corticosteroids at a dose of 1-2 mg/kg/day of predniSONE or equivalent; when dermatitis is controlled, taper corticosteroids over a period of at least 1 mo, withhold in patients with moderate to severe reactions; for mild to moderate dermatitis (localized rash and pruritus), give topical or systemic corticosteroids
- **Hepatotoxicity:** monitor liver functions tests baseline and before each dose to rule out infectious or malignant causes, increase the frequency of liver function test monitoring until resolution, permanently discontinue in patients with Grade 3-5 toxicity, give systemic corticosteroids at a dose of 1-2 mg/kg/day of predniSONE or equivalent
- **Neuropathy:** monitor for motor or sensory neuropathy (unilateral or bilateral weakness, sensory alterations, or paresthesias) before each dose; permanently discontinue if severe neuropathy (interfering with daily activities), such as Guillain-Barré–like syndromes, occur
- **Endocrinopathy:** monitor thyroid function tests at baseline and before each dose; monitor hypophysitis, adrenal insufficiency, adrenal crisis, hypo/hyperthyroidism (fatigue, headache, mental status changes, abdominal pain, unusual bowel habits, hypotension, or nonspecific symptoms that may resemble other causes)

Perform/provide:
- Storage once diluted for no more than 24 hr refrigerated or at room temperature

Evaluate:
Decreasing spread of malignant melanoma

Teach patient/family:
- To immediately report allergic reactions, skin rash, severe abdominal pain, yellowing of skin or eyes, tingling of extremities, change in bowel habits
- About the reason for treatment and expected results

ipratropium (Rx)

(i-pra-troe'pee-um)

Atrovent HFA

Func. class.: Anticholinergic, bronchodilator

Chem. class.: Synthetic quaternary ammonium compound

Do not confuse:
Atrovent/Alupent

ACTION: Inhibits interaction of acetylcholine at receptor sites on the bronchial smooth muscle, thereby resulting in decreased cGMP and bronchodilation

USES: COPD; rhinorrhea (nasal spray)

CONTRAINDICATIONS: Hypersensitivity to this product, atropine, bromide, soybean or peanut products
Precautions: Breastfeeding, children <12 yr, angioedema, heart failure, surgery, acute bronchospasm, bladder ob-

struction, closed-angle glaucoma, prostatic hypertrophy, urinary retention, pregnancy (B)

DOSAGE AND ROUTES

Bronchospasm in chronic bronchitis/emphysema

- **Adult: INH** 2 sprays (17 mcg/spray) 3-4×/day, max 12 **INH**/24 hr; **SOL** 500 mcg (1 unit dose) given 3-4×/day by nebulizer; nasal spray: 2 sprays (42 mcg/spray) 3-4×/day
- **Child 5-11 yr: INH** 4-8 inhalations q20min as needed for ≤3 hr (asthma, unlabeled); **NEB** 250-500 mcg q20min as needed for ≤3 hr (asthma, unlabeled)

Rhinorrhea perennial rhinitis

- **Adult/child ≥6 yr: INTRANASAL** 2 sprays (43 mcg)/nostril bid or tid
- **Child 5-12 yr: INTRANASAL** 2 sprays (0.03%) in each nostril 3×/day

Available forms: Aerosol 17 mcg/actuation; nasal spray 0.03%, 0.06%; sol for inh 0.0125% ♣, 0.02%

Administer:

Nebulizer route

- Use sol in nebulizer with a mouthpiece rather than a face mask

Intranasal route

- Priming pump initially requires 7 actuations of pump; priming again is not necessary if used regularly, tilt head backward after dose

SIDE EFFECTS

CNS: *Anxiety, dizziness, headache,* nervousness
CV: Palpitation
EENT: Dry mouth, blurred vision, nasal congestion
GI: *Nausea, vomiting, cramps*
INTEG: Rash
RESP: *Cough, worsening of symptoms,* **bronchospasms**

PHARMACOKINETICS

Half-life 2 hr, does not cross blood-brain barrier

INTERACTIONS

Increase: toxicity—other bronchodilators (INH)
Increase: anticholinergic action—phenothiazines, antihistamines, disopyramide

Drug/Herb

Increase: anticholinergic effect—belladonna
Increase: bronchodilator effect—green tea (large amts), guarana

NURSING CONSIDERATIONS

Assess:

- Palpitations; if severe, product may have to be changed
- Tolerance over long-term therapy; dose may have to be increased or changed
- Atropine sensitivity; patient may also be sensitive to this product
- Respiratory status: rate, rhythm, auscultate breath sounds prior to and after administration

Perform/provide:

- Storage at room temp
- Hard candy, frequent drinks, sugarless gum to relieve dry mouth

Evaluate:

- Therapeutic response: ability to breathe adequately

Teach patient/family:

- That compliance is necessary with number of inhalations/24 hr or overdose may occur; about spacer device for geriatric patients; that max therapeutic effects may take 2-3 mo
- To shake before using
- About the correct method of inhalation; how to clean equipment daily
- Patients should prime the inhaler before using for the first time by releasing 2 test sprays into the air, away from the face
- Each inhaler has 200 actuations or sprays

irbesartan (Rx)

(er-be-sar′tan)

Avapro

Func. class.: Antihypertensive

Chem. class.: Angiotensin II receptor blocker (Type AT_1)

Do not confuse:
Avapro/Anaprox

ACTION: Blocks the vasoconstrictor and aldosterone-secreting effects of angiotensin II; selectively blocks the binding of angiotensin II to the AT_1 receptor found in tissues

USES: Hypertension, alone or in combination; nephropathy in type 2 diabetic patients; proteinuria
Unlabeled uses: Heart failure

CONTRAINDICATIONS: Hypersensitivity

Black Box Warning: Pregnancy (D) 2nd/3rd trimester

Precautions: Pregnancy (C) 1st trimester, breastfeeding, children <6 yr, geriatric patients, hypersensitivity to ACE inhibitors; hepatic/renal disease; renal artery stenosis

DOSAGES AND ROUTES

Hypertension

• **Adult: PO** 150 mg/day; may be increased to 300 mg/day, volume-depleted patients: start with 75 mg/day

Nephropathy in type 2 diabetic patients

• **Adult: PO** maintenance dose 300 mg/day, start 75 mg/day

Available forms: Tabs 75, 150, 300 mg

Administer:

• Without regard to meals

• May be used with other antihypertensives, diuretic

SIDE EFFECTS

CNS: *Dizziness,* anxiety, headache, fatigue
CV: Hypotension
GI: Diarrhea, dyspepsia
HEMA: Thrombocytopenia
MISC: Edema, chest pain, rash, tachycardia, UTI, angioedema, hyperkalemia
RESP: *Cough, upper respiratory tract infection,* sinus disorder, pharyngitis, rhinitis

PHARMACOKINETICS

Peak 1.5-2 hr, extensively metabolized, half-life 11-15 hr, highly bound to plasma proteins, excreted in urine and feces, protein binding 90%

INTERACTIONS

Increase: hyperkalemia: potassium-sparing diuretics, potassium salt substitutes, ACE inhibitors
Increase: irbesartan level—CYP2C9 inhibitors (amiodarone, delavirdine, fluconazole, FLUoxetine, fluvastatin, fluvoxaMINE, imatinib, sulfonamides, sulfinpyrazone, voriconazole, zafirlukast)
Decrease: antihypertensive effect—NSAIDs

Drug/Herb

Increase: antihypertensive effect—black cohosh, goldenseal, hawthorn, kelp
Increase or decrease: antihypertensive effect—astragalus, cola tree
Decrease: antihypertensive effect—guarana, khat, licorice, yohimbe

NURSING CONSIDERATIONS

Assess:

• **Hypotension:** for severe hypotension, place in supine position and give IV infusion of NS, drug may be continued after B/P is restored

• B/P, pulse q4hr; note rate, rhythm, quality

• Baselines of renal/hepatic studies before therapy begins; periodically monitor LFTs, total/direct bilirubin

• Skin turgor, dryness of mucous membranes for hydration status; edema in feet, legs daily

Evaluate:

• Therapeutic response: decreased B/P

Teach patient/family:

• To comply with dosage schedule, even if feeling better; that max therapeutic effects may take 2-3 mo, to take without regard to food

• That product may cause dizziness, fainting, lightheadedness

• To rise slowly to sitting or standing position to minimize orthostatic hypotension

Black Box Warning: To notify prescriber if pregnancy is suspected; discontinue if pregnant; pregnancy (D) 2nd/3rd trimester, (C) 1st trimester

⚠ HIGH ALERT

irinotecan (Rx)

(ear-een-oh-tee'kan)

Camptosar

Func. class.: Antineoplastic

Chem. class.: Camptothecin analog

ACTION: Cytotoxic by producing damage to single-strand DNA during DNA synthesis; binds to topoisomerase I

USES: Metastatic carcinoma of the colon or rectum or 1st-line treatment in combination with 5-FU and leucovorin for metastatic colon or rectal carcinomas

Unlabeled uses: Cervical, gastric, lung, ovarian, pancreatic cancer, malignant glioma, rhabdomyosarcoma

CONTRAINDICATIONS: Pregnancy (D), hypersensitivity

Precautions: Breastfeeding, children, geriatric patients, irradiation, hepatic disease

Black Box Warning: Myelosuppression, diarrhea

DOSAGE AND ROUTES

First-line treatment of colorectal cancer in combination with 5-fluorouracil (5-FU):

Intravenous dosage (with bolus 5-FU/leucovorin)

• **Adult: IV** 125 mg/m² over 90 min followed by leucovorin 20 mg/m² IV bolus and then 5-FU 500 mg/m² IV bolus on days 1, 8, 15, and 22; the next course begins on day 43 or when toxicity has recovered to NCI grade 1 or less

Intravenous dosage (with infusional 5-FU/leucovorin)

• **Adult: IV** 180 mg/m² over 90 min followed by leucovorin 200 mg/m² IV over 2 hr then 5-FU bolus and continuous infusion 400 mg/m² IV bolus, then 600 mg/m² IV infusion over 22 hr on days 1, 15, and 29; leucovorin and 5-FU are given on days 1, 2, 15, 16, 29, and 30; the next course begins on day 43 or when toxicity has recovered to NCI grade 1 or less

Single-agent treatment of metastatic colorectal cancer that has recurred or progressed after 5-FU–based therapy

Intravenous dosage (weekly dosage schedule)

• **Adult: IV** 125 mg/m² over 90 min weekly × 4 wk, every 6 wk

Intravenous dosage (once-every-3-weeks dosage schedule)

• **Adult: IV** 350 mg/m² over 90 min every 3 wk

Available forms: Inj 20 mg/ml

Administer:

• Use cytotoxic handling precautions

IV route

• Premedicate with antiemetic dexamethasone 10 mg plus another antiemetic agent, such as a 5-HT_3 blocker, given at least 30 min before use

• Before beginning a course of therapy, the granulocyte count should be ≥1500, the platelet count should be ≥100,000, and treatment-related diarrhea should be fully resolved

Dilution
• Dilute appropriate dose in D_5W (preferred) or NS injection to a final concentration of 0.12–2.8 mg/ml
• Store up to 24 hr at room temperature and room lighting; however, because of possible microbial contamination during preparation, an admixture prepared with D_5W or NS should be used within 6 hr, solutions prepared with D_5W, refrigerated, protected from light must be used within 48 hr; avoid refrigeration if prepared with NS
Intravenous infusion
• Infuse intravenously over 90 min

SIDE EFFECTS

CNS: Fever, headache, chills, dizziness
CV: Vasodilation, edema, thromboembolism
GI: Severe diarrhea, *nausea, vomiting,* anorexia, constipation, cramps, flatus, stomatitis, dyspepsia, hepatotoxicity
HEMA: Leukopenia, anemia, neutropenia
INTEG: Irritation at site, rash, sweating, alopecia
MISC: Edema, asthenia, weight loss, back pain
RESP: Dyspnea, increased cough, rhinitis

PHARMACOKINETICS

Rapidly and completely absorbed, excreted in urine and bile as metabolites, half-life 6-12 hr, bound to plasma proteins 30%-68%, increased risk for toxicity in patients homozygous for UGT1A1 28

INTERACTIONS

Increase: toxicity—fluorouracil
Increase: bleeding risk—NSAIDs, anticoagulants
Increase: irinotecan levels—some CYP3A4 inhibitors (ketoconazole)
Increase: myelosuppression, diarrhea—other antineoplastics, radiation
Increase: lymphocytopenia, hyperglycemia—dexamethasone
Increase: akathisia—prochlorperazine
Increase: dehydration—diuretics
Decrease: irinotecan levels—CYP3A4 inducers (phenytoin, carBAMazepine, PHENobarbital)
Drug/Herb
Decrease: product level—St. John's wort; avoid concurrent use
Drug/Lab Test
Increase: alk phos, LFTs, bilirubin
Decrease: platelets, WBC, neutrophils, Hgb/HcT

NURSING CONSIDERATIONS

Assess:
• CNS symptoms: fever, headache, chills, dizziness

Black Box Warning: CBC, differential, platelet count weekly; use colony-stimulating factor if WBC $<2000/mm^3$ or platelet count $<100{,}000/mm^3$, Hgb ≤ 9 g/dl, neutrophil $\leq 1000/mm^3$; notify prescriber of results; product should be discontinued and colony-stimulating factor given

• Buccal cavity for dryness, sores or ulceration, white patches, oral pain, bleeding, dysphagia

Black Box Warning: GI symptoms: frequency of stools; cramping; severe, life-threatening diarrhea may occur with fluid and electrolyte imbalances, treat diarrhea within 24 hr of use with 0.25-1 mg atropine IV; treat diarrhea >24 hr of use with loperamide, diarrhea >24 hr (late diarrhea) can be fatal

• Signs of dehydration: rapid respirations, poor skin turgor, decreased urine output, dry skin, restlessness, weakness
• Bone marrow depression: bruising, bleeding, blood in stools, urine, sputum, emesis
Perform/provide:
• Increased fluid intake to 2-3 L/day to prevent dehydration unless contraindicated
• Rinsing of mouth tid-qid with water, club soda; brushing of teeth bid-tid with soft brush or cotton-tipped applicator for stomatitis; use unwaxed dental floss

Evaluate:
• Therapeutic response: decrease in tumor size, spread of cancer
Teach patient/family:
• To avoid foods with citric acid or hot or rough texture if stomatitis is present; to drink adequate fluids
• To report stomatitis; any bleeding, white spots, ulcerations in mouth; to examine mouth daily, report symptoms
• To report signs of anemia: fatigue, headache, faintness, SOB, irritability, infection, rash
• To use contraception during therapy
• To report if pregnancy is planned or suspected pregnancy (D)
• To avoid salicylates, NSAIDs, alcohol because bleeding may occur; to avoid all products unless approved by prescriber
• About alopecia; that, when hair grows back, it will be different texture, thickness
• To avoid vaccinations while taking this product
⚠ To report diarrhea that occurs 24 hr after administration; severe dehydration can occur rapidly

iron dextran (Rx)

DexFerrum, INFeD
Func. class.: Hematinic
Chem. class.: Ferric hydroxide complex with dextran

ACTION: Iron is carried by transferrin to the bone marrow, where it is incorporated into hemoglobin

USES: Iron-deficiency anemia

CONTRAINDICATIONS:

Black Box Warning: Hypersensitivity

Precautions: Pregnancy (C), breastfeeding, neonates, infants <4 mo, children, acute renal disease, asthma, rheumatoid arthritis (IV), ankylosing spondylitis, lupus, hypotension, all anemias excluding iron-deficiency anemia, hepatic/cardiac/renal disease

DOSAGE AND ROUTES

• Total dose in ml = [0.0442 × (desired Hb − observed Hb) × LBW] + (0.26 × LBW)
• **Adult and child: IM** 0.5 ml as a test dose by Z-track then no more than the total dose including test dose following/day:
• **Adult/adolescent/child >15 kg: IM** 100 mg/day
• **Child (10-15 kg): IM** 100 mg/kg
• **Child/infant >4 mo (5-9.9 kg): IM** 50 mg/day
• **Infant >4 mo (<5 kg): IM** 25 mg/day
Available forms: Inj 50 mg/ml (2-ml, 10-ml vials)
Administer:
• D/C oral iron before parenteral; give only after test dose of 25 mg by preferred route; wait at least 1 hr before giving remaining portion
IM route
• IM deeply in large muscle mass; use Z-track method, 19-20G 2-3–in needle; ensure needle long enough to place product deep in muscle; change needles after withdrawing product and before injecting to prevent skin, tissue staining
⚠ Only with EPINEPHrine available in case of anaphylactic reaction during dose
IV route
• IV after flushing with 10 ml 0.9% NaCl; give undiluted; may be diluted in 50-250 ml NS for inf; give ≤1 ml (50 mg) over ≥1 min; flush line after use with 10 ml 0.9% NaCl; patient should remain recumbent for ½-1 hr
• IV inj requires single-dose vial without preservative; verify on label that IV use approved

SIDE EFFECTS

CNS: Headache, paresthesia, dizziness, shivering, weakness, seizures
CV: Chest pain, shock, hypotension, tachycardia
GI: *Nausea*, vomiting, metallic taste, abdominal pain
HEMA: Leukocytosis
INTEG: Rash, pruritus, urticaria, fever, sweating, chills, brown skin discolor-

ation, pain at inj site, necrosis, sterile abscesses, phlebitis
OTHER: Anaphylaxis
RESP: Dyspnea

PHARMACOKINETICS

IM: Excreted in feces, urine, bile, breast milk; crosses placenta; most absorbed through lymphatics; can be gradually absorbed over weeks/months from fixed locations

INTERACTIONS

Increase: toxicity—oral iron; do not use
Decrease: reticulocyte response—chloramphenicol
Drug/Lab Test
False increase: serum bilirubin
False decrease: serum calcium
False positive: ^{99m}Tc diphosphate bone scan, iron test (large doses >2 ml)

NURSING CONSIDERATIONS

Assess:
- Observe for 1 hr after test dose
- Blood studies: Hct, Hgb, reticulocytes, transferrin, plasma iron concentrations, ferritin, total iron binding, bilirubin before treatment, at least monthly

Black Box Warning: Allergy: anaphylaxis, rash, pruritus, fever, chills, wheezing; notify prescriber immediately, keep emergency equipment available

- Cardiac status: anginal pain, hypotension, tachycardia
- Nutrition: amount of iron in diet (meat, dark green leafy vegetables, dried beans, dried fruits, eggs)
- Cause of iron loss or anemia, including use of salicylates, sulfonamides
- **Toxicity:** nausea, vomiting, diarrhea, fever, abdominal pain (early symptoms), cyanotic-looking lips, nailbeds, seizures, CV collapse (late symptoms)

Perform/provide:
- Storage at room temp in cool environment
- Recumbent position 30 min after IV inj to prevent orthostatic hypotension
- Therapeutic response: increased serum iron levels, Hct, Hgb

Teach patient/family:
- That iron poisoning may occur if increased beyond recommended level; not to take oral iron preparation or vitamins containing iron
- That delayed reaction may occur 1-2 days after administration and last 3-4 days (IV), 3-7 days (IM); to report fever, chills, malaise, muscle, joint aches, nausea, vomiting, backache
- To avoid breastfeeding
- That stools may become dark

TREATMENT OF OVERDOSE:

Discontinue product, treat allergic reaction, give diphenhydrAMINE or EPINEPHrine as needed, give iron-chelating product for acute poisoning

iron sucrose (Rx)

Venofer
Func. class.: Hematinic
Chem. class.: Ferric hydroxide complex with dextran

ACTION: Iron is carried by transferrin to the bone marrow, where it is incorporated into hemoglobin

USES: Iron-deficiency anemia
Unlabeled uses: Dystrophic epidermolysis bullosa (DEB)

CONTRAINDICATIONS: Hypersensitivity, all anemias excluding iron-deficiency anemia, iron overload
Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, abdominal pain, anaphylactic shock, arthralgia, chest pain, cough, diarrhea, dizziness, dyspnea, edema, increased LFTs, fever, headache, heart failure, hypo/hypertension, infection, MS pain nausea/vomiting, seizures, weakness

DOSAGE AND ROUTES

- **Adult: IV** 5 ml (100 mg of elemental iron) given during dialysis; most will need 1000 mg of elemental iron over 10 sequential dialysis sessions

• **Child ≥2 yr/adolescents: IV** 0.5 mg/kg by slow IV inj over 5 min (undiluted) or diluted in 25 ml of 0.9% NaCl, give over 5-60 min, max 100 mg every 2 wk × 12 wk

Available forms: Inj 20 mg/ml

Administer:

⚠ Only with EPINEPHrine, Solu-medrol available in case of anaphylactic reaction during dose

IV route

• Do not use if particulate is present or if discolored

• Give directly in dialysis line by slow inj or inf; give by slow inj at 1 ml/min (5 min/vial); inf dilute each vial exclusively in ≤100 ml 0.9% NaCl, give at 100 mg of iron/15 min; discard unused portions

• Do not use with IV products

SIDE EFFECTS

CNS: Headache, dizziness

CV: Chest pain, hypo/hypertension, hypervolemia, heart failure

GI: *Nausea, vomiting, abdominal pain*

INTEG: Rash, pruritus, urticaria, fever, sweating, chills

OTHER: Anaphylaxis, hyperglycemia

RESP: Dyspnea, pneumonia, cough

PHARMACOKINETICS

Excreted in urine, half-life 6 hr

INTERACTIONS

Increase: toxicity—oral iron, dimercaprol, do not use

Decrease: iron sucrose effect—chloramphenicol

Drug/Lab Test

Increase: glucose

NURSING CONSIDERATIONS

Assess:

• Blood studies: Hct, Hgb, reticulocytes, transferrin, plasma iron concentrations, ferritin, total iron binding; bilirubin before treatment, at least monthly

• Allergy, anaphylaxis: rash, pruritus, fever, chills, wheezing; notify prescriber immediately, keep emergency equipment available

• Cardiac status: hypo/hypertension, hypervolemia

• **Toxicity:** nausea, vomiting, diarrhea, fever, abdominal pain (early symptoms), cyanotic-looking lips, nailbeds, seizures, CV collapse (late symptoms)

Perform/provide:

• Storage at room temp in cool environment, do not freeze

Evaluate:

• Therapeutic response: increased serum iron levels, Hct, Hgb

Teach patient/family:

• To report itching, rash, chest pain, headache, vertigo, nausea, vomiting, abdominal pain, joint/muscle pain, numbness, tingling

• That iron poisoning may occur if dosage increased beyond recommended level; not to take oral iron preparation

TREATMENT OF OVERDOSE:

Discontinue product, treat allergic reaction, give diphenhydrAMINE or EPINEPHrine as needed, give iron-chelating product for acute poisoning

isoflurophate ophthalmic

See Appendix B

isoniazid (Rx)

(eye-soe-nye'a-zid)

Isotamine ♣

Func. class.: Antitubercular

Chem. class.: Isonicotinic acid hydrazide

ACTION: Bactericidal interference with lipid, nucleic acid biosynthesis

USES: Treatment, prevention of TB

CONTRAINDICATIONS: Hypersensitivity

Black Box Warning: Acute hepatic disease

Precautions: Pregnancy (C), renal disease, diabetic retinopathy, cataracts, ocular defects, IV drug users, >35 yr, postpartum, HIV, neuropathy

Black Box Warning: Alcoholism, females (African descent/Hispanic patients)

DOSAGE AND ROUTES

- **Adult/adolescent with/without HIV: PO/IM** 5 mg/kg/day ≤300 mg/day or 15 mg/kg 2-3×/wk, max 900 mg 2-3×/wk
- **Child/infant with HIV: PO/IM** 10-15 mg/kg/day, max 300 mg/day

Available forms: Tabs 100, 300 mg; inj 100 mg/ml

Administer:

PO route

- PO with meals to decrease GI symptoms; better to take on empty stomach 1 hr before or 2 hr after meals

IM route

- IM deep in large muscle mass; massage; rotate inj site; warm inj to room temp to dissolve crystals

SIDE EFFECTS

CNS: *Peripheral neuropathy, dizziness,* memory impairment, toxic encephalopathy, seizures, psychosis, slurred speech

EENT: Blurred vision, optic neuritis

GI: *Nausea, vomiting,* epigastric distress, jaundice, fatal hepatitis

HEMA: Agranulocytosis, hemolytic, aplastic anemia, thrombocytopenia, eosinophilia, methemoglobinemia

Hypersensitivity: Fever, skin eruptions, lymphadenopathy, vasculitis

MISC: Dyspnea, B_6 deficiency, pellagra, hyperglycemia, metabolic acidosis, gynecomastia, rheumatic syndrome, SLE-like syndrome

PHARMACOKINETICS

Metabolized in liver, excreted in urine (metabolites), crosses placenta, excreted in breast milk, half life 1-4 hr

PO: Peak 1-2 hr

IM: Peak 45-60 min

INTERACTIONS

Increase: toxicity—tyramine foods, alcohol, cycloSERINE, ethionamide, rifampin, carBAMazepine, phenytoin, benzodiazepines, meperidine

Increase: serotonin syndrome—SSRIs, SNRIs

Decrease: absorption—aluminum antacids

Decrease: effectiveness of BCG vaccine, ketoconazole

Drug/Food

- Do not give with high-tyramine foods, alcohol

Drug/Lab Test

Increase: LFTs, bilirubin, glucose

Decrease: platelets granulocytes

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Hepatic studies weekly: baseline in all patients, those >35 yr and all women should be monitored periodically; ALT, AST, bilirubin; increased test results may indicate hepatitis; hepatic status: decreased appetite, jaundice, dark urine, fatigue, those with fast acetylation (genetic) may metabolize product more than 5 times faster (black, Asian patients are at greater risk) some Caucasian patients; fatal hepatitis is at greater risk in black/Hispanic patients after birth

- Mental status often: affect, mood, behavioral changes; psychosis may occur
- Paresthesia in hands, feet

Evaluate:

- Therapeutic response: decreased symptoms of TB

Teach patient/family:

- That compliance with dosage schedule, duration is necessary; not to skip or double dose
- That scheduled appointments must be kept or relapse may occur

⚠ To avoid alcohol while taking product; may increase risk for hepatic injury

• That, if diabetic, to use blood glucose monitor to obtain correct result

⚠ To report weakness, fatigue, loss of appetite, nausea, vomiting, jaundice of skin or eyes, tingling/numbness of hands/feet

Black Box Warning: Fatal hepatitis: to notify prescriber immediately of yellow skin/eyes, dark urine, loss of appetite

TREATMENT OF OVERDOSE:
Pyridoxine

isosorbide dinitrate (Rx)
(eye-soe-sor'bide)
Apo-ISDN ✦, Dilatrate-SR, Isochron, IsoDitrate, Isordil

isosorbide mononitrate (Rx)
Apo-ISMN ✦, Imdur
Func. class.: Antianginal, vasodilator
Chem. class.: Nitrate

Do not confuse:
Imdur/Imuran/Inderal/K-Dur

ACTION:
Relaxation of vascular smooth muscle, which leads to decreased preload, afterload, which is responsible for decreasing left ventricular end-diastolic pressure, systemic vascular resistance, and reducing cardiac oxygen demand

USES:
Treatment, prevention of chronic stable angina pectoris
Unlabeled uses: Diffuse esophageal spasm, heart failure (dinitrate)

CONTRAINDICATIONS:
Hypersensitivity to this product or nitrates; severe anemia, increased intracranial pressure, cerebral hemorrhage, acute MI
Precautions: Pregnancy (C), breastfeeding, children, postural hypotension, MI, CHF, severe renal/hepatic disease

DOSAGE AND ROUTES

Dinitrate
• **Adult: PO** 5-20 mg bid-tid initially, maintenance 10-40 mg bid-tid; **SL,** buccal 2.5-5 mg, may repeat q5-10min × 3 doses; **EXT REL** 40-80 mg q8-12hr, max 160 mg/day

Mononitrate
• **Adult: PO** (Monoket) 10-20 mg bid, 7 hr apart; (Imdur) initiate at 30-60 mg/day as a single dose, increase q3days as needed, may increase to 120 mg/day, max 240 mg/day
Available forms: *Dinitrate:* sus rel caps (SR) 40 mg, SR tabs 40 mg; tabs 5, 10, 20, 30, 40 mg; SL tabs 2.5, 5 mg; *mononitrate:* tabs (Monoket) 10, 20 mg; ext rel (Imdur) 30, 60, 120 mg
Administer:
• Do not break, crush, or chew sus rel caps, SL tabs
• After checking expiration date
• PO with 8 oz water on empty stomach
• SL tabs should be placed under the tongue until dissolved; avoid smoking, eating, drinking until dissolved

SIDE EFFECTS
CNS: *Vascular headache, flushing, dizziness,* weakness, faintness
CV: *Postural hypotension,* tachycardia, collapse, syncope, palpitations
GI: Nausea, vomiting, diarrhea
INTEG: Pallor, sweating, rash
MISC: Twitching, hemolytic anemia, methemoglobinemia, tolerance

PHARMACOKINETICS
Dinitrate
Metabolized by liver, excreted in urine as metabolites (80%-100%)
PO: Onset 15-30 min, duration 4-6 hr, half-life 5-6 hr
SUS REL: Onset ≤4 hr, duration 6-8 hr
SL: Onset 2-5 min, duration 1-4 hr, half-life 2 hr
Mononitrate
SUS REL: Onset 30-60 min, peak 1-4 hr, duration 6-8 hr, half-life 5 hr

INTERACTIONS

⚠ Fatal hypotension: sildenafil, tadalafil, vardenafil, do not use together

Increase: hypotension—β-blockers, diuretics, antihypertensives, alcohol, calcium channel blockers, phenothiazines

NURSING CONSIDERATIONS

Assess:

- **Anginal pain:** duration, time started, activity being performed, character
- **Methemoglobinemia (rare):** Cyanosis of lips, nausea/vomiting, coma, shock, usually caused by high dose of product but may occur with normal dosing
- B/P, pulse, respirations during beginning therapy and periodically thereafter
- Tolerance if taken over long period, to prevent, allow intervals of 12-14 hr/day without product
- Headache, lightheadedness, decreased B/P; may indicate a need for decreased dosage, treat headache with OTC analgesics

Evaluate:

- Therapeutic response: decrease or prevention of anginal pain

Teach patient/family:

- To leave tabs in original container
- To avoid alcohol, OTC products unless approved by prescriber
- That product may cause headache; that taking with meals may reduce or eliminate headache; to take no later than 7 PM (last dose)
- To avoid hazardous activities if dizziness occurs
- About the importance of complying with complete medical regimen
- To make position changes slowly to prevent orthostatic hypotension
- Not to use with sildenafil, tadalafil, vardenafil with nitrates, may cause serious drop in B/P
- Not to discontinue abruptly, may cause heart attack
- To use at beginning of angina symptoms, may repeat every 15 mins; if no relief, seek medical attention immediately

RARELY USED

isotretinoin (Rx)

(eye-soe-tret'i-noyn)

Amnesteem, Claravis, Sotret

Func. class.: Antiacne agent, retinoid

USES: Severe recalcitrant nodulocystic acne

CONTRAINDICATIONS: Hypersensitivity, inflamed skin

Black Box Warning: Pregnancy (X)

DOSAGE AND ROUTES

- **Adult: PO** 0.5-2 mg/kg/day in 2 divided doses × 15-20 wk; if relapse occurs, repeat after 2 mo off product

itraconazole (Rx)

(it-ra-con'a-zol)

Sporanox

Func. class.: Antifungal, systemic

Chem. class.: Triazole derivative

ACTION: Alters cell membranes; inhibits several fungal enzymes

USES: Histoplasmosis, blastomycosis (pulmonary and extrapulmonary), aspergillosis, onychomycosis of toenail/fingernail

Unlabeled uses: Dermatomycosis, histoplasmosis, chromoblastomycosis, coccidioidomycosis, pityriasis versicolor, sebopsoriasis, vaginal candidiasis, cryptococcus, subcutaneous mycoses, dimorphic infections, fungal keratitis, zygomycosis, superficial mycoses (dermatophytoses), chronic mucocutaneous candidiasis

CONTRAINDICATIONS: Hypersensitivity, fungal meningitis; onychomycosis or dermatomycosis with cardiac dysfunction, in pregnant women

Black Box Warning: Heart failure, ventricular dysfunction, coadministration with other products

Precautions: Pregnancy (C), breastfeeding, children, cardiac/renal/hepatic disease, achlorhydria or hypochlorhydria (product-induced), dialysis

DOSAGE AND ROUTES

Dose varies with type of infection

- **Adult: PO** 200 mg/day with food; may increase to 400 mg/day if needed; life-threatening infections may require a loading dose of 200 mg tid × 3 days
- **Child: PO** 3-5 mg/kg/day

Available forms: Caps 100 mg; oral sol 10 mg/ml

Administer:

- In the presence of acid products only; do not use alkaline products, antacids within 2 hr of product; may give coffee, tea, acidic fruit juices

PO route

- Swallow caps whole; do not break, crush, or chew caps
- Give caps after full meal to ensure absorption
- Oral sol: patient should swish in mouth vigorously, use on empty stomach
- Oral sol and caps are not interchangeable on mg/mg basis

SIDE EFFECTS

CNS: *Headache, dizziness,* insomnia, somnolence, depression

CV: Hypertension

GI: *Nausea, vomiting, anorexia, diarrhea,* cramps, abdominal pain, flatulence, GI bleeding, hepatotoxicity

GU: Gynecomastia, impotence, decreased libido

INTEG: *Pruritus,* fever, *rash,* toxic epidermal necrolysis

MISC: *Edema, fatigue,* malaise, hypokalemia, tinnitus, rhabdomyolysis

PHARMACOKINETICS

PO: Peak 3-5 hr; half-life 21 hr, IV 35.4 hr; metabolized in liver; excreted in bile, feces, urine 40%; requires acid pH for absorption; distributed poorly to CSF; 99.8% protein bound; inhibits CYP4503A4

INTERACTIONS

⚠ Life-threatening CV reactions: pimozide, quiNIDine, dofetilide, levomethadyl

Increase: tinnitus, hearing loss—quiNIDine

Increase: hepatotoxicity—other hepatotoxic products

Increase: edema—calcium channel blockers

Increase: severe hypoglycemia—oral hypoglycemics

Increase: sedation—ALPRAZolam, clorazepate, diazepam, estazolam, flurazepam, triazolam, oral midazolam

Increase: levels, toxicity—busPIRone, busulfan, clarithromycin, cycloSPORINE, diazepam, digoxin, felodipine, fentaNYL, atorvastatin, carBAMazepine, disopyramide, indinavir, isradipine, niCARdipine, niFEDipine, niMODipine, phenytoin, quiNIDine, QUEtiapine, ritonavir, saquinavir, tacrolimus, warfarin

Decrease: itraconazole action—antacids, H_2-receptor antagonists, rifamycins, didanosine, carBAMazepine, isoniazid, proton pump inhibitors

Drug/Food

- Food increases absorption
- Grapefruit juice decreases itraconazole level

NURSING CONSIDERATIONS

Assess:

- **CHF:** if present, discontinue product
- Type of infection; may begin treatment prior to obtaining results
- **Infection:** temp, WBC, sputum at baseline and periodically
- I&O ratio, potassium levels
- Hepatic studies (ALT, AST, bilirubin) if patient receiving long-term therapy
- Allergic reaction: rash, photosensitivity, urticaria, dermatitis
- ⚠ **Hepatotoxicity:** nausea, vomiting, jaundice, clay-colored stools, fatigue

Perform/provide:
• Storage in tight container at room temp, do not freeze
Evaluate:
• Therapeutic response: decreased fever, malaise, rash, negative C&S for infecting organism
Teach patient/family:
• That long-term therapy may be needed to clear infection (1 wk-6 mo, depending on infection)
• To avoid hazardous activities if dizziness occurs
• To take 2 hr before administration of other products that increase gastric pH (antacids, H_2-blockers, omeprazole, sucralfate, anticholinergics); to avoid grapefruit juice; to notify health care provider of all medications taken; to take after a full meal (caps) or on empty stomach (oral sol)
• About the importance of compliance with product regimen; to use alternative methods of contraception
• To notify prescriber of GI symptoms; signs of hepatic dysfunction (fatigue, jaundice, nausea, anorexia, vomiting, dark urine, pale stools); heart failure (trouble breathing, unusual weight gain, fatigue, swelling); hearing changes

ixabepilone (Rx)

(ix-ab-ep'i-lone)

Ixempra

Func. class.: Antineoplastic—miscellaneous

Chem. class.: Epothilone

ACTION: Microtubule stabilizing agent; microtubules are needed for cell division

USES: Breast cancer

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, hypersensitivity to products with polyoxyethylated castor oil, neutropenia of $<1500/mm^3$, thrombocytopenia

Black Box Warning: Hepatic disease

Precautions: Children, geriatric patients, alcoholism, bone marrow suppression, cardiac dysrhythmias, cardiac/renal disease, diabetes mellitus, peripheral neuropathy, ventricular dysfunction

DOSAGE AND ROUTES

Breast cancer, metastatic or locally advanced given with capecitabine and resistant to anthracycline, taxane
• **Adult: IV INF** 40 mg/m² over 3 hr q3wk plus capecitabine **PO** 2000 mg/m²/day in 2 divided doses on days 1-14 q21days; in those with BSA >2.2 m², dose should be calculated for a BSA of 2.2 m²

Breast cancer, metastatic or locally advanced resistant/refractory to anthracycline, taxane, capecitabine
• **Adult: IV INF** 40 mg/m² over 3 hr q3wk; in those with BSA >2.2 m², dose should be calculated for a BSA of 2.2 m²

Dosage reduction in those taking a strong CYP3A4 inhibitor
• **Adult: IV INF** 20 mg/m² over 3 hr q3wk

Available forms: Powder for inj 15, 45 mg

Administer:
• Premedicate with histamine antagonists 1 hr before use, prevents hypersensitivity
• Antiemetic 30-60 min before product and prn

IV route
• Let kit stand at room temp for 30 min; to reconstitute, withdraw supplied diluent (8 ml for 15-mg vials, 23.5 ml for 45-mg vials); slowly inject sol into vial; gently swirl and invert to mix, final conc 2 mg/ml; further dilute in LR in DEHP-free bags, final conc should be between 0.2 and 0.6 mg/ml; after added, mix by manual rotation
• Diluted sol stable for 6 hr at room temp; inf must be completed within 6 hr
• Use in-line filter, 0.2-1.2 micron
• Give over 3 hr

SIDE EFFECTS

CNS: *Peripheral neuropathy,* impaired cognition, chills, fatigue, fever, flushing, headache, insomnia, *asthenia*
CV: Bradycardia, *hypotension,* abnormal ECG, angina, atrial flutter, cardiomyopathy, chest pain, edema, MI, vasculitis
GI: *Nausea, vomiting, diarrhea,* abdominal pain, anorexia, colitis, constipation, gastritis, jaundice, GERD, hepatic failure, trismus
GU: Renal failure
HEMA: Neutropenia, thrombocytopenia, anemia, infections, coagulopathy
INTEG: *Alopecia,* rash, hot flashes
META: Hypokalemia, metabolic acidosis
MS: *Arthralgia, myalgia*
RESP: Bronchospasm, cough, dyspnea
SYST: *Hypersensitivity reactions,* anaphylaxis, dehydration, radiation recall reaction

PHARMACOKINETICS

Metabolized in liver by P45CYP3A4; excreted in feces (65%) and urine (21%); terminal half-life 52 hr

INTERACTIONS

Increase: ixabepilone level—CYP3A4 inhibitors (amiodarone, amprenavir, aprepitant, atazanavir, chloramphenicol, clarithromycin, conivaptan, cycloSPORINE, danazol, darunavir, dalfopristin, delavirdine, diltiazem, erythromycin, estradiol, fluconazole, fluvoxaMINE, fosamprenavir, imatinib, indinavir, isoniazid, itraconazole, ketoconazole, lopinavir, miconazole, nefazodone, nelfinavir, propoxyphene, ritonavir, RU-486, saquinavir, tamoxifen, telithromycin, troleandomycin, verapamil, voriconazole, zafirlukast)
Decrease: ixabepilone levels—CYP3A4 inducers (aminoglutethimide, barbiturates, bexarotene, bosentan, carBAMazepine, dexamethasone, efavirenz, griseofulvin, modafinil, nafcillin, nevirapine, OXcarbazepine, phenytoin, rifamycin, topiramate)

Drug/Herb
- Avoid use with St. John's wort

Drug/Food
- Avoid use with grapefruit products

NURSING CONSIDERATIONS

Assess:
- CBC, differential, platelet count prior to treatment and weekly; withhold product if WBC is $<1500/mm^3$ or platelet count is $<100{,}000/mm^3$, notify prescriber
- Monitor temp q4hr (may indicate beginning infection)

Black Box Warning: Liver function tests before, during therapy (bilirubin, AST, ALT, LDH) prn or monthly; check for jaundiced skin and sclera, dark urine, clay-colored stools, itchy skin, abdominal pain, fever, diarrhea

- VS during 1st hr of infusion; check IV site for signs of infiltration

⚠ Hypersensitivity reactions, anaphylaxis including hypotension, dyspnea, angioedema, generalized urticaria; discontinue inf immediately; keep emergency equipment available

- Effects of alopecia on body image; discuss feelings about body changes

Evaluate:
- Therapeutic response: decreased tumor size, spread of malignancy

Teach patient/family:
- To report signs of infection: fever, sore throat, flulike symptoms
- To report signs of anemia: fatigue, headache, faintness, SOB
- To report any complaints or side effects to nurse or prescriber
- That hair may be lost during treatment; that a wig or hairpiece may make patient feel better; that new hair may be different in color, texture
- That pain in muscles and joints 2-5 days after inf is common
- To use nonhormonal type of contraception
- To avoid receiving vaccinations while receiving product

ketoconazole (Rx)

(kee-toe-koe'na-zole)
Func. class.: Antifungal
Chem. class.: Imidazole derivative

ACTION: Alters cell membrane permeability and inhibits several fungal enzymes, thereby leading to cell death

USES: Systemic candidiasis, chronic mucocandidiasis, oral thrush, candiduria, coccidioidomycosis, histoplasmosis, chromomycosis, paracoccidioidomycosis, blastomycosis; tinea cruris, tinea corporis, tinea versicolor, *Pityrosporum ovale*
Unlabeled uses: Cushing's syndrome, advanced prostatic cancer, candidiasis/fungal prophylaxis, fungal keratitis, leishmaniasis

CONTRAINDICATIONS: Breastfeeding, hypersensitivity, fungal meningitis

Black Box Warning: Coadministration with other products (ergot derivatives, cisapride, or triazolam) may cause fatal cardiac arrhythmias due to inhibition of CYP3A4 enzyme system

Precautions: Pregnancy (C), children <2 yr, renal disease, achlorhydria (product-induced)

Black Box Warning: Hepatic disease

DOSAGE AND ROUTES

- **Adult: PO** 200-400 mg/day for 1-2 wk (candidiasis), 6 wk (other infections)
- **Child ≥2 yr: PO:** 3.3-6.6 mg/kg/day as a single daily dose

Prostate cancer (unlabeled)

- **Adult: PO** 400 mg tid

Available forms: Tabs 200 mg; oral susp 100 mg/5 ml ♣
Administer:

- In the presence of acid products only; do not use alkaline products, proton pump inhibitors, H_2-antagonists, antacids within 2 hr of product; may give coffee, tea, acidic fruit juices, cola
- With food to decrease GI symptoms
- With HCl if achlorhydria is present; dissolve tab/4 ml of aqueous sol 0.2 N hydrochloric acid; use straw to avoid contact; rinse with water afterward and swallow

SIDE EFFECTS

CNS: Headache, dizziness, somnolence
GI: Nausea, vomiting, anorexia, diarrhea, abdominal pain, hepatotoxicity
GU: Gynecomastia, impotence
HEMA: Thrombocytopenia, leukopenia, hemolytic anemia
INTEG: Pruritus, fever, chills, photophobia, rash, dermatitis, purpura, urticaria
SYST: Anaphylaxis, angioedema

PHARMACOKINETICS

PO: Peak 1-2 hr; half-life 2 hr, terminal 8 hr; metabolized in liver; excreted in bile, feces; requires acid pH for absorption; distributed poorly to CSF; highly protein bound

INTERACTIONS

Increase: effect of CNS depression—chlordiazePOXIDE, clonazePAM, clorazepate, diazepam, estazolam, flurazepam, prazepam, quazepam, avoid concurrent use
Decrease: effect of—theophylline
Decrease: metabolism of PACLitaxel
Increase: hepatotoxicity—other hepatotoxic products, alcohol
Increase: anticoagulant effect—warfarin, anticoagulants
Increase: effect of toxicity: alfentanil, ALPRAZolam, amprenavir, ARIPiprazole, atorvastatin, calcium channel blockers, carBAMazepine, clarithromycin, corticosteroids, cyclophosphamide, cycloSPORINE, donepezil, eletriptan, erythromycin, fentaNYL, ifosfamide, indinavir, lovastatin, midazolam, nelfinavir, nisoldipine, quiNIDine, ritonavir, saquinavir, sildenafil, simvastatin, SUFentanil, tamoxifen, triazolam,

vinBLAStine, vinca alkaloids, vinCRIStine, zolpidem

Decrease: action of ketoconazole—antacids, H_2-receptor antagonists, anticholinergics, phenytoin, isoniazid, rifampin, ddI, gastric acid pump inhibitors

Drug/Lab Test

Increase: alkaline phosphatase, LFTs, lipids

Decrease: Hgb, WBC, platelets

NURSING CONSIDERATIONS

Assess:

- Infection symptoms before and after treatment
- C&S before starting treatment
- Allergic reaction: rash, photosensitivity, urticaria, dermatitis

Black Box Warning: Hepatotoxicity: nausea, vomiting, jaundice, clay-colored stools, fatigue; hepatic studies (ALT, AST, bilirubin) if patient receiving long-term therapy, use cautiously in those with hepatic disease

- Using with CYP3A4 inhibitors can lead to increased product level, toxicity

Perform/provide:

- Storage in tight container at room temp

Evaluate:

- Therapeutic response: decreased fever, malaise, rash, negative C&S for infectious organism, absence of scaling

Teach patient/family:

- That long-term therapy may be needed to clear infection (1 wk-6 mo, depending on infection)
- To avoid hazardous activities if dizziness occurs
- To take 2 hr before administration of other products that increase gastric pH (antacids, H_2-blockers, omeprazole, sucralfate, anticholinergics)
- About the importance of compliance with product regimen, that testing will be done periodically to indicate if infection has been eradicated
- To decrease nausea, divide dose with meals
- Not to use any products (OTC, herbal) unless approved by prescriber

Black Box Warning: To notify prescriber of GI symptoms, signs of hepatic dysfunction (fatigue, nausea, anorexia, vomiting, dark urine, pale stools)

- To use sunglasses to prevent photophobia (rare)
- To notify prescriber if pregnancy is planned or suspected; do not breastfeed

ketoconazole (topical)

(kee-toe-koe'na-zole)

Extina, Ketoderm ✤, Ketodan, Nizoral, Nizoral A-D, Xolegel

Func. class.: Topical antifungal

Chem. class.: Imidazole derivative

K

ACTION: Antifungal activity results from altering cell membrane permeability

USES: Seborrheic dermatitis (immunocompromised), tinea corporis, cruris, pedis, versicolor, dandruff

CONTRAINDICATIONS: Hypersensitivity, sulfite allergy

Precautions: Pregnancy (C), breastfeeding, children

DOSAGE AND ROUTES

Seborrheic dermatitis:

- **Adult/child ≥12 yr: TOP FOAM** apply to affected areas bid × 4 wk
- **GEL** apply to affected areas daily × 2 wk

Tinea corporis, cruris, pedis, versicolor

- **Adult: TOP** cover areas daily × 2 wk

Dandruff:

- **Adult: SHAMPOO** wet hair, lather, massage for 1 min, rinse, repeat 2×/wk spaced by 3 days, for up to 8 wk, then as needed

Available forms: Topical gel, foam, cream 2%; shampoo 1%, 2%

Administer:

Topical route

- For external use only; do not use skin products near the eyes, nose, or mouth, wash hands before and after use
- **Cream/lotion:** Apply to the cleansed affected area, massage gently into affected areas, do not use on skin that is broken or irritated

SIDE EFFECTS

INTEG: Irritation, stinging, pustules, pruritus

NURSING CONSIDERATIONS

Assess allergic reaction:

- Assess for hypersensitivity, product might need to be discontinued

⚠ Assess for sulfate allergy; may be life threatening

Evaluate:

- Decreased itching scaling

Teach patient/family:

Topical route

- Topical skin products are not for intravaginal therapy and are for external use only; do not use skin products near the eyes, nose, or mouth, wash hands before and after use
- **Cream/Ointment/Lotion:** Apply a thin film to the cleansed affected area, massage gently into affected areas
- **Foam Formulations:** Do not dispense foam directly onto hands or face; the warmth of the skin will cause the foam to melt; instead, dispense desired amount directly into the cap or onto a cool surface; make sure enough foam is dispensed to cover the affected area(s); if the can feels warm or the foam seems runny, run the can under cold water; to apply, pick up small amounts of the foam with the fingertips and gently massage into the affected areas until the foam disappears
- To continue for prescribed time, tinea corporis/cruris ≥2 wk

ketoprofen (OTC, Rx)

(ke-toe-proe'fen)

Apo-Keto ♣

Func. class.: Nonsteroidal antiinflammatory product (NSAID), antirheumatic

Chem. class.: Propionic acid derivative

ACTION: Inhibits COX-1, COX-2; analgesic, antiinflammatory, antipyretic

USES: Mild to moderate pain, osteoarthritis, rheumatoid arthritis, dysmenorrhea; OTC relief of minor aches, pains

Unlabeled uses: Ankylosing spondylitis, bone pain, gouty arthritis

CONTRAINDICATIONS: Pregnancy (D) 2nd/3rd trimester, hypersensitivity to this product, NSAIDs, salicylates; asthma, severe renal/hepatic disease, ulcer disease

Black Box Warning: Perioperative pain with CABG

Precautions: Pregnancy (B) 1st trimester, breastfeeding, children, geriatric patients, bleeding, GI/cardiac disorders, hypersensitivity to other antiinflammatory agents

Black Box Warning: GI bleeding, MI, stroke

DOSAGE AND ROUTES

Antiinflammatory

- **Adult: PO** 50 mg qid or 75 mg tid, max 300 mg/day or **EXT REL** 200 mg/day

Analgesic

- **Adult: PO** 25-50 mg q6-8hr, max 300 mg/day

Available forms: Caps 50, 75 mg; ext rel cap 200 mg

Administer:

- Do not break, crush, or chew ext rel caps
- Give 30 min before or 2 hr after meals, use full glass of water

SIDE EFFECTS

CNS: Dizziness, drowsiness, fatigue, tremors, confusion, insomnia, anxiety, depression, headache
CV: Tachycardia, peripheral edema, palpitations, dysrhythmias, hypertension, CV thrombotic events, MI, stroke
EENT: Tinnitus, hearing loss, blurred vision
GI: *Nausea, anorexia, vomiting, diarrhea,* jaundice, hepatitis, constipation, flatulence, cramps, dry mouth, peptic ulcer, GI bleeding
GU: Nephrotoxicity: dysuria, hematuria, oliguria, azotemia
HEMA: Blood dyscrasias
INTEG: Purpura, rash, pruritus, sweating
SYST: Anaphylaxis

PHARMACOKINETICS

PO: Peak 1.2 hr; ext rel 6.8 hr, half-life 2–4 hr; 5.4 hr ext rel, metabolized in liver, urine (metabolites), breast milk; 99% plasma protein binding

INTERACTIONS

Increase: serotonin syndrome—SSRIs, SNRIs
Increase: hypoglycemia—insulin, sulfonylureas
Increase: toxicity—cycloSPORINE, lithium, methotrexate, phenytoin, alcohol
Increase: bleeding risk—anticoagulants, clopidogrel, eptifibatide, plicamycin, thrombolytics, ticlopidine, tirofiban, valproic acid, SSRIs
Increase: ketoprofen levels—aspirin, probenecid
Increase: adverse GI reactions—aspirin, corticosteroids, NSAIDs, alcohol
Increase: hematologic toxicity—radiation, antineoplastics
Decrease: effect of diuretics, antihypertensives

Drug/Herb

Increase: bleeding risk—feverfew, garlic, ginger, ginkgo

Drug/Lab Test

Increase: BUN, alk phos, AST, ALT, LDH, creatinine, bleeding time

NURSING CONSIDERATIONS

Assess:

- **Pain:** type, location, intensity, ROM before and 1-2 hr after treatment
- Renal, hepatic, blood studies: BUN, creatinine, AST, ALT, Hgb before treatment, periodically thereafter

⚠ Aspirin sensitivity, asthma; these patients may be more likely to develop hypersensitivity to NSAIDs

- Audiometric, ophthalmic exam before, during, after treatment
- For eye/ear problems: blurred vision, tinnitus; may indicate toxicity

Black Box Warning: GI bleeding: blood in sputum, emesis, stools

Black Box Warning: CV thrombotic events: MI, stroke

Perform/provide:

- Storage at room temp

Evaluate:

- Therapeutic response: decreased pain, stiffness, swelling in joints; ability to move more easily; decreased fever

Teach patient/family:

- To report blurred vision, ringing, roaring in ears; may indicate toxicity
- To avoid driving, other hazardous activities if dizziness, drowsiness occurs, especially in geriatric patients
- To report immediately change in urine pattern, increased weight, edema, increased pain in joints, fever, blood in urine (indicate nephrotoxicity); rash, itching, blurred vision, ringing in ears, flulike symptoms; blood in urine, vomit, or stools (bleeding)
- That therapeutic effects may take up to 1 mo; to take with 8 oz water; to sit upright for ½ hr after administration to prevent GI irritation, not to crush, chew ext rel products
- To avoid aspirin, alcohol, corticosteroids, acetaminophen, other medications, supplements unless approved by prescriber
- To wear sunscreen, protective clothing to prevent photosensitivity

K

• To report product use to all health care providers
• To report planned or suspected pregnancy (D) (2nd/3rd trimester), (C) (1st trimester); avoid breastfeeding

ketorolac (ophthalmic)

(kee'toe-role-ak)

Acular, Acular PF, Acular LS, Acuvail

Func. class.: Antiinflammatory (ophthalmic)

Chem. class.: Nonsteroidal antiinflammatory drug

ACTION: Inhibits miosis by inhibiting the biosynthesis of ocular prostaglandins; prostaglandins play a role in the miotic response produced during ocular surgery by constricting the iris sphincter independently of cholinergic mechanisms

USES: Pain and inflammation after cataract surgery, refractive surgery, seasonal allergic conjunctivitis

CONTRAINDICATIONS: Hypersensitivity to this product, sulfites, NSAIDs, salicylates
Precautions: Bleeding disorders, complicated ocular surgery, corneal denervation, diabetes mellitus, rheumatoid arthritis, dry eye syndrome, pregnancy (C), breastfeeding, children, contact lens

DOSAGE AND ROUTES

Seasonal Allergic Conjunctivitis (Acular)
• **Adult/child ≥3 yr:** Instill 1 drop into affected eye qid
Inflammation after cataract extraction (Acular)
• **Adult: OPHTH** 1 drop in affected eye qid beginning 24 hr after surgery × 2 wk
Corneal refracture surgery, pain, burning (Acular LS)
• **Adult: OPHTH** 1 drop in affected eye qid × ≤4 days
• Incision refraction surgery, pain, photophobia (Acular PF)
• **Adult: OPHTH** 1 drop qid in affected eye × 3 days
Cataract surgery, pain, inflammation (Acuvail)
• **Adult: OPHTH** 1 drop bid in affected eye, starting 1 day before surgery, on the day of surgery, × 2 wks after surgery
Available forms: Ophthalmic solution Acular (0.5%), Acular PF (0.5%), Acular LS (0.4%), Acuvail (0.45%)
Administer:
• Apply topically to the eye, separate by ≥5 min when using with other ophthalmics
• Remove contact lenses before instillation of solution
• Instruct patient on proper instillation of eye solution
• Do not touch the tip of the dropper to the eye, fingertips, or other surface
• Do not share bottle with other patients

SIDE EFFECTS

CNS: Headache
EENT: Abnormal sensation in eye, conjunctival hyperemia, ocular irritation, ocular pain, ocular pruritus, conjunctival hyperemia, iritis, keratitis

NURSING CONSIDERATIONS

Assess:
• Eyes: For pain, inflammation, burning, redness after cataract surgery
Evaluate:
• Decreased pain and inflammation after cataract surgery, refractive surgery, seasonal allergic conjunctivitis
Teach patient/family:
• To apply topically to the eye
• To remove contact lenses before instillation of solution
• Proper instillation of eye solution

- Not to touch the tip of the dropper to the eye, fingertips, or other surface
- Not to share bottle with other patients

ketorolac (systemic, nasal) (Rx)

(koe-toe'role-ak)

Toradol ✦, Sprix

Func. class.: Nonsteroidal antiinflammatory/nonopioid analgesic

Chem. class.: Acetic acid

ACTION: Inhibits prostaglandin synthesis by decreasing an enzyme needed for biosynthesis; analgesic, antiinflammatory, antipyretic effects

USES: Mild to moderate pain (short term); seasonal allergic conjunctivitis (ophthalmic)

CONTRAINDICATIONS: Pregnancy (D) 3rd trimester, hypersensitivity, asthma, hepatic disease, peptic ulcer disease, CV bleeding

Black Box Warning: Breastfeeding, severe renal disease, L&D, perioperative pain in CABG, before major surgery, epidural/intrathecal administration, GI bleeding, hypovolemia

Precautions: Pregnancy (C), GI/cardiac disorders, hypersensitivity to other antiinflammatory agents, CCr <25 ml/min

Black Box Warning: Children, geriatric patients, bleeding, MI, stroke

DOSAGE AND ROUTES

- **Adult/adolescent >17 yr and ≥50 kg:** **PO** continuation from **IM/IV** only 20 mg then 10 mg q4-6hr prn, max 40 mg/day; **NASAL** 1 spray (15.75 mg spray) in each nostril (31.5 mg/spray) q6-8hr; max 4 doses/day × 5 days
- **Adult/adolescent >17 yr and <50 kg:** **IM** (single dose) 30-60 mg, **IV** 15-30 mg; **IM/IV** (multiple dosing) 15-30 mg q6hr, max 60 mg/day × 5 days combined either **PO/IM/IV**; **NASAL** 1 spray (15.75 mg/spray) in 1 nostril q6-8hr, max 4 doses/day × 5 days

Renal dose

- Do not use in advanced renal disease

Available forms: Inj 15, 30 mg/ml (prefilled syringes); tab 10 mg; nasal spray 15.75 mg/spray

Administer:

- Not to exceed 5 days

IM route

- IM inj deeply in large muscle mass

Nasal route

- Prime pump before using for the first time, point away from person/pets, pump activator 5 times, no need to reprime
- For single use only, discard 24 hr after opening if not used
- Do not share with others
- Have patient blow nose, sit upright to spray

IV route

- Give undiluted over ≥15 sec

Solution compatibility: D_5W, 0.9% NaCl, LR, D_5, Plasma-Lyte A

Syringe compatibilities: SUFentanil

Y-site compatibilities: Cisatracurium, remifentanil, SUFentanil

SIDE EFFECTS

CNS: Dizziness, *drowsiness*, tremors, seizures

CV: Hypertension, flushing, syncope, pallor, edema, vasodilation, CV thrombotic events, MI, stroke

EENT: Tinnitus, hearing loss, blurred vision

GI: Nausea, anorexia, vomiting, diarrhea, constipation, flatulence, cramps, dry mouth, peptic ulcer, GI bleeding, perforation, taste change, hepatitis, hepatic failure

GU: Nephrotoxicity: dysuria, hematuria, oliguria, azotemia

HEMA: Blood dyscrasias, prolonged bleeding

INTEG: Purpura, rash, pruritus, sweating, angioedema, Stevens-Johnson syndrome, toxic epidermal necrolysis

K

PHARMACOKINETICS

Half-life 6 hr, enters breast milk, <50% metabolized by liver, excreted by kidneys
PO: Peak 2-3 hr, duration 4-6 hr
IM: Peak 50 min
Nasal: Peak $^1/_2$-2 hr, duration 6-8 hr

INTERACTIONS

Increase: toxicity—methotrexate, lithium, cycloSPORINE, pentoxifylline, probenecid
Increase: bleeding risk—anticoagulants, cefamandole, cefoperazone, cefoTEtan, clopidogrel, eptifibatide, plicamycin, salicylates, ticlopidine, tirofiban, thrombolytics, valproic acid, SSRIs, SNRIs
Increase: renal impairment—ACE inhibitors
Increase: ketorolac levels—aspirin, other NSAIDs; contraindicated
Increase: GI effects—corticosteroids, alcohol, aspirin, NSAIDs
Decrease: effects—antihypertensives, diuretics
Drug/Lab Test
Increase: AST, ALT, LDH, bleeding time

NURSING CONSIDERATIONS

Assess:
• **Aspirin sensitivity, asthma:** patients may be more likely to develop hypersensitivity to NSAIDs; monitor for hypersensitivity
• **Pain:** type, location, intensity, ROM before and 1 hr after treatment

Black Box Warning: Renal, hepatic, blood studies: BUN, creatinine, AST, ALT, Hgb before treatment, periodically thereafter; check for dehydration

Black Box Warning: Bleeding times; check for bruising, bleeding, occult blood in urine

Black Box Warning: Do not use epidurally, intrathecally, alcohol is present in the solution

• Eye/ear problems: blurred vision, tinnitus (may indicate toxicity)

Hepatic dysfunction: jaundice, yellow sclera and skin, clay-colored stools

Black Box Warning: CV thrombotic events: MI, stroke, do not use in perioperative pain in CABG

• Audiometric, ophthalmic exam before, during, after treatment
Perform/provide:
• Storage at room temp, protect from light
Evaluate:
• Therapeutic response: decreased pain, stiffness, swelling in joints, ability to move more easily
Teach patient/family:
• To report blurred vision, ringing/roaring in ears (may indicate toxicity)
• To avoid driving, other hazardous activities if dizziness or drowsiness occurs

Black Box Warning: To report change in urine pattern, weight increase, edema; pain increase in joints, fever, blood in urine (indicates nephrotoxicity); bruising, black tarry stools (indicates bleeding); pruritus, jaundice, nausea, right upper quadrant pain, abdominal pain (hepatotoxicity); to notify prescriber immediately

• To avoid alcohol, salicylates, other NSAIDs, acetaminophen
• To report product use to all health care providers, not to use with other products unless approved by prescriber; use for ≤5 days

Black Box Warning: Not to breastfeed

• **Nasal:** to discard within 24 hr of opening; may cause irritation, may drink water after dose
• To report if pregnancy is planned or suspected pregnancy (C) systemic, do not breastfeed

ketotifen (ophthalmic)

(kee-toe-tye'fen)

Alaway, Zaditor, Zyrtec Itchy Eye, Claritin Eye

Func. class.: Antihistamine (ophthalmic)

Chem. class.: Histamine 1 receptor antagonist/mast cell stabilizer

ACTION: A topically active, direct H_1-receptor antagonist and mast cell stabilizer; by reducing these inflammatory mediators, relieves the ocular pruritus associated with allergic conjunctivitis

USES: For the temporary relief of ocular pruritus due to ragweed, pollen, grass, animal hair, animal dander

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (C), breastfeeding, children, contact lenses

DOSAGE AND ROUTES

• **Adult/child ≥3 yr:** OPHTH instill 1 drop in affected eye(s) every 8-12 hr

Available forms: Ophthalmic solution 0.025%

Administer:

Ophthalmic route

• For topical ophthalmic use only

• Wash hands before and after use; tilt the head back slightly and pull the lower eyelid down with the index finger; squeeze the prescribed number of drops into the conjunctival sac and gently close eyes for 1–2 min, do not blink

• Do not touch the tip of the dropper to the eye, fingertips, or other surface

• Wait ≥10 min after instilling the ophthalmic solution before inserting contact lenses; contact lenses should not be worn if eye is red

• Do not share ophthalmic drops with others

SIDE EFFECTS

CNS: Headache

EENT: Conjunctival hyperemia, rhinitis, allergic reactions, ocular irritation consisting of burning or stinging, conjunctivitis, eyelid disorder, flu syndrome, keratitis, lacrimation disorder, mydriasis, ocular discharge, ocular pain, pharyngitis, photophobia, pruritus, rash, xerophthalmia (dry eyes)

NURSING CONSIDERATIONS

Assess:

• Eyes: for itching, redness, use of soft or hard contact lens

Evaluate:

• Absence of redness, itching in the eyes

Teach patient/family:

Ophthalmic route

• That product is for topical ophthalmic use only

• To wash hands before and after use; tilt the head back slightly and pull the lower eyelid down with the index finger; squeeze the prescribed number of drops into the conjunctival sac and gently close eyes for 1–2 min; not to blink

• Not to touch the tip of the dropper to the eye, fingertips, or other surface

• To wait ≥10 min after instilling the ophthalmic solution before inserting contact lenses; contact lenses should not be worn if eye is red

• Not to share ophthalmic drops with others

• To remove contact lenses before use because the preservative benzalkonium chloride may be absorbed by soft contact lenses; that product should not be used to treat contact lens–related irritation

K

labetalol (Rx)

(la-bet'a-lole)

Trandate

Func. class.: Antihypertensive, antianginal

Chem. class.: α-1/β-Blocker

Do not confuse:
Trandate/Tridrate

ACTION: Produces decreases in B/P without reflex tachycardia or significant reduction in heart rate through mixture of α-blocking, β-blocking effects; elevated plasma renins are reduced

USES: Mild to moderate hypertension; treatment of severe hypertension (IV)
Unlabeled uses: Hypertension in patients with pheochromocytoma, hypertension during cloNIDine withdrawal, pediatric hypertension

CONTRAINDICATIONS: Hypersensitivity to β-blockers, cardiogenic shock, heart block (2nd or 3rd degree), sinus bradycardia, CHF, bronchial asthma
Precautions: Pregnancy (C), breastfeeding, geriatric patients, major surgery, diabetes mellitus, thyroid/renal/hepatic disease, COPD, well-compensated heart failure, CAD, nonallergic bronchospasm, peripheral vascular disease

Black Box Warning: Abrupt discontinuation

DOSAGE AND ROUTES

Hypertension

- **Adult: PO** 100 mg bid; may be given with diuretic; may increase to 200 mg bid after 2 days; may continue to increase q1-3days; max 2400 mg/day in divided doses
- **Child/adolescent (unlabeled): PO** 1-3 mg/kg/day, titrate to max 10-20 mg/kg/day based on B/P; **IV** 0.2-1 mg/kg over 2 min, max 40 mg/dose; **IV INF** 0.25-3 mg/kg/hr

Hypertensive crisis

- **Adult: IV INF** 200 mg/160 ml D_5W run at 2 mg/min or 1.6 ml/min; stop inf at desired response, repeat q6-8hr as needed; **IV BOL** 20-80 mg over 2 min, may repeat q10min, not to exceed 300 mg

Available forms: Tabs 100, 200, 300 mg; inj 5 mg/ml

Administer:

- PO before meals, at bedtime; tab may be crushed or swallowed whole; give with meals to increase absorption
- Reduced dosage for renal dysfunction
- Do not discontinue before surgery

Direct IV route

- Give undiluted (5 mg/ml) over 2 min

Continuous IV INF route

- Diluted in LR, D_5W, D_5 in 0.2%, 0.9%, 0.33% NaCl, Ringer's inj; inf is titrated to patient response; 200 mg of product/160 ml sol = 1 mg/ml; 300 mg of product/240 ml sol = 1 mg/ml; 200 mg of product/250 ml sol = 2 mg/3 ml; use inf pump
- Keep patient recumbent during and for 3 hr after administration; monitor VS q5-15min

Y-site compatibilities: Amikacin, aminophylline, amiodarone, ampicillin, butorphanol, calcium gluconate, ceftAZidime, ceftizoxime, cimetidine, diltiazem, DOBUTamine, DOPamine, enalaprilat, EPINEPHrine, erythromycin, esmolol, famotidine, fentaNYL, gentamicin, HYDROmorphone, lidocaine, LORazepam, magnesium sulfate, meperidine, metroNIDAZOLE, midazolam, milrinone, morphine, niCARdipine, nitroglycerin, norepinephrine, nitroprusside, oxacillin, potassium chloride, potassium phosphate, propofol, ranitidine, sodium acetate, tobramycin, vancomycin, vecuronium

SIDE EFFECTS

CNS: Dizziness, mental changes, drowsiness, fatigue, headache, catatonia, depression, anxiety, nightmares, paresthesias, lethargy

CV: *Orthostatic hypotension, bradycardia,* CHF, chest pain, ventricular dysrhythmias, AV block, scalp tingling
EENT: *Tinnitus,* visual changes; sore throat; double vision; dry, burning eyes, floppy iris syndrome
GI: *Nausea, vomiting, diarrhea,* dyspepsia, taste distortion
GU: Impotence, dysuria, ejaculatory failure
HEMA: Agranulocytosis, thrombocytopenia, purpura (rare)
INTEG: Rash, alopecia, urticaria, pruritus, fever, exfoliative dermatitis
RESP: Bronchospasm, dyspnea, wheezing

PHARMACOKINETICS

Half-life 2.5-8 hr, metabolized by liver (metabolites inactive), excreted in urine, crosses placenta, excreted in breast milk, protein binding 50%
PO: Onset 30 min, peak 2-4 hr, duration 8-12 hr
IV: Onset 5 min, peak 15 min, duration 2-4 hr

INTERACTIONS

• Do not use within 2 wk of MAOIs
Increase: myocardial depression—hydantoins, general anesthetics, verapamil, class I antidysrhythmics
Increase: tremor—tricyclic antidepressants
Increase: hypotension—diuretics, other antihypertensives, cimetidine, nitroglycerin, alcohol, nitrates
Decrease: effects of—sympathomimetics, lidocaine, theophylline, β-blockers, bronchodilators, xanthines
Decrease: antihypertensive effect—NSAIDs, salicylates
Increase or decrease: effects of—antidiabetics

Drug/Herb
Increase: antihypertensive effect—hawthorn
Decrease: antihypertensive effect—ephedra

Drug/Lab Test
Increase: ANA titer, blood glucose, alk phos, LDH, AST, ALT, BUN, potassium, triglyceride, uric acid, serum lipoprotein
False increase: urinary catecholamines

NURSING CONSIDERATIONS

Assess:
• **Hypertension:** B/P during beginning treatment, periodically thereafter; note pulse, rate, rhythm, quality; apical/radial pulse before administration; notify prescriber of any significant changes
⚠ CHF: I&O, weight daily; fluid overload: weight gain, jugular venous distention, edema, crackles in lungs

Black Box Warning: **Abrupt discontinuation:** product should be tapered to prevent adverse reactions

• Baselines of renal/hepatic studies before therapy begins
Perform/provide:
• Storage in dry area at room temp; do not freeze
Evaluate:
• Therapeutic response: decreased B/P after 1-2 wk
Teach patient/family:

Black Box Warning: Not to discontinue product abruptly; to taper over 2 wk; may cause precipitate angina

• Not to use OTC products containing α-adrenergic stimulants (nasal decongestants, OTC cold preparations) unless directed by prescriber
• To report bradycardia, dizziness, confusion, depression, fever
• To take pulse at home; advise when to notify prescriber
• To avoid alcohol, smoking, increased sodium intake
• To comply with weight control, dietary adjustments, modified exercise program
• To carry emergency ID to identify product, allergies
• To avoid hazardous activities if dizziness is present
• **To report symptoms of CHF:** difficulty breathing, especially on exertion or when

lying down; night cough; swelling of extremities

- To take medication at bedtime to prevent effect of orthostatic hypotension; to rise slowly
- To avoid driving or other hazardous activities until response is known; dizziness, drowsiness, may occur
- To wear support hose to minimize effects of orthostatic hypotension

TREATMENT OF OVERDOSE:

Lavage, IV glucagonor atropine for bradycardia, IV theophylline for bronchospasm; digoxin, O_2, diuretic for cardiac failure; hemodialysis useful for removal/hypotension; administer vasopressor

lacosamide (Rx)

(la-koe'sa-mide)

Vimpat

Func. class.: Anticonvulsant

Chem. class.: Functionalized amino acid

ACTION:

May act through action at sodium channels; exact action is unknown

USES:

Adjunctive therapy for partial seizures

CONTRAINDICATIONS:

Hypersensitivity

Precautions: Pregnancy (C), breastfeeding, children <17 yr, geriatric patients, allergies, cardiac/renal/hepatic disease, acute MI, atrial fibrillation/flutter, AV block, bradycardia, CHD, dehydration, depression, dialysis, hazardous activity, electrolyte imbalance, heart failure, labor, PR prolongation, sick sinus syndrome, substance abuse, suicidal ideation, syncope, torsades de pointes

DOSAGE AND ROUTES

- **Adult and adolescent ≥17 yr: PO** 50 mg bid, may increase weekly by 100 mg bid to 200-400 mg/day; **IV** 50 mg bid, infuse over 30-60 min, may be increased by 100 mg/day weekly up to 200-400 mg/day maintenance

Renal/hepatic dose

- **Adult: PO/IV** max 300 mg/day for mild to moderate hepatic disease or CCr ≤30 ml/min

Available forms: Film-coated tabs 50, 100, 150, 200 mg; IV 20 ml single-use vials (200 mg/20 ml); oral sol 10 mg/ml

Administer:

PO route

- **Tablet:** give without regard to meals
- **Oral sol:** measure with calibrated measuring device

IV route

- May give undiluted or mixed in 0.9%NaCl, D_5, or LR
- Infuse over 30-60 min
- Do not use if discolored or if particulates are present; discard unused portions

SIDE EFFECTS

CNS: Dizziness, syncope, tremor, vertigo, ataxia, drowsiness, fever, hypoesthesia, paresthesias, depression, fatigue, headache, confusion, irritability, psychologic dependence, suicidal ideation

CV: Atrial fibrillation/flutter, AV block, bradycardia, myocarditis, orthostatic hypotension, palpitations, PR prolongation

EENT: Diplopia, blurred vision, nystagmus, tinnitus

GI: Nausea, constipation, vomiting, hepatitis, diarrhea, dyspepsia

HEMA: Anemia, neutropenia

INTEG: Rash, erythema, inj site reaction, pruritus, xerostomia

MS: Asthenia, dysarthria

SYST: Drug reaction with eosinophilia, systemic symptoms (DRESS)

PHARMACOKINETICS

Metabolized by liver; excreted by kidneys, 95%; protein binding <15%

PO: Peak 1-4 hr

IV: Peak 30-60 min; half-life 13 hr; elimination half-life 15-23 hr

INTERACTIONS

Increase: PR prolongation—beta-blockers, calcium channel blockers, atazanavir, dronedarone, digoxin, lopinavir, ritonavir

Increase: lincosamide effect—CYP2C19 inhibitors (fluconazole, isoniazid, miconazole)

Drug/Lab Test

Increase: LFTs

NURSING CONSIDERATIONS

Assess:

- **Seizures:** duration, type, intensity precipitating factors
- Renal function: albumin concentration
- CV status: orthostatic hypotension, PR prolongation; monitor cardiac status throughout treatment
- Mental status: mood, sensorium, affect, memory (long, short term), depression, suicidal ideation, psychologic dependence
- Rash, hypersensitivity reactions
- **Pregnancy:** Enroll in UCB Antiepileptic Drugs Registry 1-888-537-7734

Perform/provide:

- Storage of PO products/IV vials at room temp; sol is stable for 24 hr when mixed with compatible diluents in glass or PVC bags at room temp

Evaluate:

- Therapeutic response: decrease in severity of seizures

Teach patient/family:

- Not to discontinue product abruptly; to taper over 1 week because seizures may occur
- To avoid hazardous activities until stabilized on product
- To carry emergency ID stating product use
- To notify prescriber of suicidal thoughts/behaviors, syncope, cardiac changes
- To notify prescriber if pregnancy is planned or suspected
- That interactions with other medications may occur
- To consult MedGuide for proper use, risks

lactulose (Rx)

(lak'tyoo-lose)

Constulose, Enulose, Generlac, Kristalose

Func. class.: Laxative; ammonia detoxicant (hyperosmotic)

Chem. class.: Lactose synthetic derivative

ACTION: Prevents absorption of ammonia in colon by acidifying stool; increases water, softens stool

USES: Chronic constipation, portal-systemic encephalopathy in patients with hepatic disease

CONTRAINDICATIONS: Hypersensitivity, low-galactose diet

Precautions: Pregnancy (B), breast-feeding, geriatric patients, debilitated patients, diabetes mellitus

DOSAGE AND ROUTES

Constipation

- **Adult: PO** 15-30 ml/day (10-20 g), may increase to 60 ml/day prn
- **Child: PO** 7.5 ml/day

Hepatic encephalopathy

- **Adult: PO** 30-45 ml (20-30 g) tid or qid until stools soft; **RETENTION ENEMA** 300 ml (200 g) diluted
- **Child: PO** 40-90 ml/day in 3-4 divided doses
- **Infant: PO** 2.5-10 ml/day in divided doses

Available forms: Oral sol (encephalopathy) 10 g/15 ml; oral sol (constipation) 10 g/15 ml

Administer:

PO route

- With 8 oz fruit juice, water, milk to increase palatability of oral form; for rapid effect, give on empty stomach
- Increased fluids to 2 L/day; do not give with other laxatives; if diarrhea occurs, reduce dosage

• **Kristalose:** dissolve contents of packet/4 oz water

Rectal route

• **Retention enema** by diluting 300 ml lactose/700 ml of water; administer by rectal balloon catheter

SIDE EFFECTS

GI: *Nausea, vomiting, anorexia, abdominal cramps,* diarrhea, flatulence, distention, belching

META: Hypernatremia

PHARMACOKINETICS

Metabolized in colon, excreted by kidneys, onset 1-2 days, peak unknown, duration unknown

INTERACTIONS

• Do not use with other laxatives (hepatic encephalopathy)

Increase: GI obstruction—NIFEdipine ext-rel tabs

Decrease: lactulose effects—neomycin, other oral antiinfectives, antacids

Drug/Herb

Increase: laxative action—flax, senna

Drug/Lab Test

Increase: blood glucose (diabetic patients)

Decrease: blood ammonia

NURSING CONSIDERATIONS

Assess:

• **Stool:** amount, color, consistency

• **Cause of constipation;** determine whether fluids, bulk, or exercise is missing from lifestyle; use of constipating products

• **Hepatic encephalopathy:** blood ammonia level (30-70 mg/100 ml); may decrease ammonia level by 25%-50%; clearing of confusion, lethargy, restlessness, irritability if portal-systemic encephalopathy

• Blood, urine electrolytes if product used often; may cause diarrhea, hypokalemia, hyponatremia

• I&O ratio to identify fluid loss

• Cramping, rectal bleeding, nausea, vomiting; if these symptoms occur, product should be discontinued

Evaluate:

• Therapeutic response: decreased constipation, decreased blood ammonia level, clearing of mental state

Teach patient/family:

• Not to use laxatives long term

• To dilute with water or fruit juice to counteract sweet taste

• To store in cool environment; not to freeze

• To take on an empty stomach for rapid action

• To report diarrhea; may indicate overdose

lamiVUDine 3TC (Rx)

(lam-i-voo'deen)

Epivir, Epivir HBV

Func. class.: Antiretroviral

Chem. class.: Nucleoside reverse transcriptase inhibitor (NRTI)

Do not confuse:

lamiVUDine/lamoTRIgine

ACTION: Inhibits replication of HIV virus by incorporating into cellular DNA by viral reverse transcriptase, thereby terminating cellular DNA chain

USES: HIV-1 infection in combination with at least 2 other antiretrovirals; chronic hepatitis B (Epivir-HBV)

Unlabeled uses: Prophylaxis of HIV: postexposure with indinavir and zidovudine

CONTRAINDICATIONS: Hypersensitivity

Black Box Warning: Lactic acidosis

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, granulocyte count $<1000/mm^3$ or Hgb <9.5 g/dl, renal disease, pancreatitis, peripheral neuropathy

Black Box Warning: Severe hepatic dysfunction

DOSAGE AND ROUTES

HIV

- **Adult and adolescent >16 yr: PO** 150 mg bid or 300 mg/day
- **Child 3 mo-16 yr: PO** 4 mg/kg bid, max 150 mg bid

Chronic hepatitis B

- **Adult: PO** 100 mg/day
- **Child and adolescent 2-17 yr: PO** 3 mg/kg/day, max 100 mg

Renal dose

- **Adult: PO** CCr 30-49 ml/min: Epivir 150 mg/day; Epivir HBV 100 mg 1st dose then 50 mg/day; CCr 15-29 ml/min: Epivir 150 mg 1st dose then 100 mg/day; Epivir HBV 100 mg 1st dose then 25 mg/day; CCr 5-14 ml/min: Epivir 150 mg 1st dose then 50 mg/day; Epivir HBV 35 mg 1st dose then 15 mg/day; CCr <5 ml/min: Epivir 50 mg 1st dose then 25 mg/day; Epivir HBV 35 mg 1st dose then 10 mg/day

Available forms: (Epivir) oral sol 10 mg/ml; tabs 150, 300 mg; **(Epivir HBV)** oral sol 5 mg/ml; tabs 100 mg

Administer:

- PO daily or bid, without regard to meals
- Epivir and Epivir HBV are not interchangeable
- With other antiretrovirals only

SIDE EFFECTS

CNS: *Fever, headache, malaise, dizziness, insomnia, depression, fatigue, chills,* seizures, peripheral neuropathy, paresthesias

EENT: Taste change, hearing loss, photophobia

GI: *Nausea, vomiting, diarrhea,* anorexia, cramps, dyspepsia, hepatomegaly with steatosis, pancreatitis

HEMA: Neutropenia, anemia, thrombocytopenia

INTEG: *Rash*

MS: *Myalgia, arthralgia, pain*

RESP: *Cough*

SYST: Lactic acidosis, anaphylaxis, Stevens-Johnson syndrome

PHARMACOKINETICS

Rapidly absorbed, distributed to extravascular space, excreted unchanged in urine, protein binding <36%, terminal half-life 5-7 hr

INTERACTIONS

Decrease: both products—zalcitabine; avoid concurrent use

Increase: lamiVUDine level—trimethoprim-sulfamethoxazole, amiloride, dofetilide, entecavir, metformin, memantine, procainamide, trospium

- Do not use with emtricitabine, duplication

Decrease: lamiVUDine effect—interferons

Drug/Lab Test

Increase: ALT, bilirubin

Decrease: Hgb, neutrophil, platelet count

NURSING CONSIDERATIONS

Assess:

- **HIV:** Test for HIV before starting treatment, blood counts q2wk; watch for neutropenia, thrombocytopenia, Hgb, CD4, viral load; if low, therapy may have to be discontinued and restarted after hematologic recovery; blood transfusions may be required; assess for lessening of symptoms; if HBV is present, a higher dose of Epivir-HBV is needed
- **Hepatitis B:** fatigue, anorexia, pruritus, jaundice during and for several months after discontinuation; AST, ALT, bilirubin; amylase, lipase, triglycerides, periodically during treatment
- **Children for pancreatitis:** abdominal pain, nausea, vomiting, neuropathy

Black Box Warning: Lactic acidosis, severe hepatomegaly with steatosis: obtain baseline LFTs, if elevated, discontinue treatment; discontinue even if LFTs are normal if lactic acidosis, severe hepatomegaly develops, may be fatal

Perform/provide:
- Storage in cool environment; protect from light

Evaluate:
- Decreasing symptoms of HIV, CD4, viral load

Teach patient/family:
- That GI complaints, insomnia resolve after 3-4 wk of treatment
- That product is not a cure for HIV but will control symptoms; that compliance is necessary; to take as directed; to complete full course of treatment even if feeling better
- To notify prescriber of sore throat, swollen lymph nodes, malaise, fever, peripheral neuropathy; other infections may occur
- That patient is still infective, may pass HIV virus on to others
- That follow-up visits must be continued since serious toxicity may occur; that blood counts must be done
- That other products may be necessary to prevent other infections
- That product may cause fainting or dizziness
- Not to breastfeed, excreted in breast milk

lamoTRIgine (Rx)

(la-moe'tri-geen)

LaMICtal, LaMICtal CD, LaMICtal ODT, LaMICtal XR

Func. class.: Anticonvulsant—miscellaneous

Chem. class.: Phenyltriazine

Do not confuse:
lamoTRIgine/lamiVUDine
LaMICtal/Lomotil/LamISIL

ACTION: Inhibits voltage-sensitive sodium channels, thus decreasing seizures

USES: Adjunct for the treatment of partial, tonic-clonic seizures; children with Lennox-Gastaut syndrome, bipolar disorder

Unlabeled uses: Absence, seizures

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (C) (cleft lip/palate during 1st trimester), breastfeeding, geriatric patients, cardiac/renal/hepatic disease, severe depression, suicidal, blood dyscrasias

Black Box Warning: Children <16 yr

DOSAGE AND ROUTES

Seizures: monotherapy

- **Adult and adolescent ≥16 yr: PO** 50 mg/day while receiving 1 enzyme-inducing AED (carBAMazepine, PHENobarbital, phenytoin, primidone but not valproic acid) wk 1-2, then increase to 100 mg divided bid wk 3-4; maintenance 300-500 mg/day; EXT REL 50 mg/day × 1-2 wk, then 100 mg/day wk 3-4, then 200 mg/day wk 5, then 300 mg/day wk 6, then 400 mg/day wk 7; after wk 7, range is 400-600 mg/day
- **Adolescent <16 yr and child: PO** 0.3 mg/kg/day wk 1-2, then 0.6 mg/kg/day wk 3-4; depends on use of AED; usual dose 4.5-7.5 mg/kg/day, max 300 mg/day

Monotherapy for patients taking valproate

- **Adult and adolescent ≥16 yr receiving lamoTRIgine and valproate without enzyme-inducing drug: PO** (immediate release) stabilize on valproate, target dose of 200 mg/day lamoTRIgine; if patient is not taking lamoTRIgine 200 mg/day, increase dose by 25-50 mg/day q1-2wk to reach 200 mg/day; while maintaining lamoTRIgine 200 mg/day, decrease valproate to 500 mg/day by ≤500 mg/day/wk, maintain valproate at 500 mg/day × 1 wk, then increase lamoTRIgine to 300 mg/day while decreasing valproate 250 mg/day × 1 wk, then discontinue valproate and increase lamoTRIgine by 100 mg/day/wk to maintenance of 500 mg/day

Seizures: multiple therapy with valproate

• **Adult and adolescent ≥16 yr: PO** 25 mg every other day then 25 mg/day wk 3-4, increase by 25-50 mg q1-2wk, maintenance 100-400 mg/day

• **Adolescent <16 yr and child: PO** 0.1-0.2 mg/kg/day initially then increase q2wk as needed to 1-5 mg/kg/day or 200 mg/day

Bipolar disorder (escalation regimen for those not taking carBAMazepine, other enzyme-inducing drugs, or valproate)

• **Adult and adolescent ≥16 yr: PO** wk 1-2, 25 mg/day; wk 3-4, 50 mg/day; wk 5, 100 mg/day; wk 6-7, 200 mg/day; for patients taking valproic acid: wk 1-2, 25 mg every other day; wk 3-4, 25 mg/day; wk 5, 50 mg/day; wk 6, 100 mg/day; wk 7, 100 mg/day

Hepatic dose

• **Adult: PO** moderate hepatic impairment or severe without ascites: reduce by 25%; severe hepatic impairment with ascites: reduce by 50%

Absence seizures (unlabeled)

• **Adolescent and child 3-13 yr: PO** 0.5 mg/kg/day in 2 divided doses × 2 wk then 1 mg/kg/day in 2 divided doses × 2 wk, adjusted q5days

Available forms: Tabs 25, 100, 150, 200 mg; PO ext rel 25-50-100, 50-100-200 mg titration kit; PO 25-100 mg starter kit; ext rel 25, 50, 100, 250 mg; chew dispersible tabs 5, 25 mg; oral disintegrating tab 25, 50, 100, 200 mg; oral disintegrating tab 25-50, 50-100 mg, 25-50-100 mg titration kit

Administer:

• Correct starter kit; errors have occurred

• Discontinue all products gradually over ≥2 wk; abrupt discontinuation can increase seizures

• **Chewable dispersible tab:** may be swallowed whole, chewed, mixed in water or fruit juice; to mix, add to small amount of liquid in glass or spoon; tabs will dissolve in 1 min, then mix in more liquid and swirl and swallow immediately

• **Orally disintegrating tabs:** place on tongue, move around in mouth, when disintegrated, swallow; examine blister pack before use, do not use if blisters are torn or missing

• **Extended-release tabs:** swallow whole, do not cut, break, chew; without regard to food

SIDE EFFECTS

CNS: *Dizziness,* ataxia, *headache,* fever, insomnia, tremor, depression, anxiety, suicidal ideation

EENT: Nystagmus, *diplopia, blurred vision*

GI: *Nausea, vomiting, anorexia, abdominal pain,* hepatotoxicity

GU: *Dysmenorrhea*

HEMA: Anemia, DIC, leukopenia, thrombocytopenia

INTEG: Rash (potentially life-threatening), alopecia, photosensitivity

SYST: Stevens-Johnson syndrome, angioedema, toxic epidermal necrolysis

PHARMACOKINETICS

Half-life varies depending on dose; terminal half-life 24 hr, 15 hr with enzyme inducers; rapidly, completely absorbed; metabolized by glucuronic acid conjunction; protein binding 55%; peak 1.4-2.3 hr; crosses placenta; excreted in breast milk

INTERACTIONS

Decrease: metabolic clearance of lamoTRIgine—valproic acid, CYP3A4 inhibitors

Decrease: lamoTRIgine concentration—carBAMazepine, rifamycins, oral contraceptives, acetaminophen, phenytoin, primodone, PHENobarbital, OXcarbazepine, succinimides, estrogen

Drug/Herb

Increase: anticonvulsant effect—ginkgo

Decrease: anticonvulsant effect—ginseng

NURSING CONSIDERATIONS

Assess:

• **Seizure:** duration, type, intensity, halo before seizure

⚠ Rash (Stevens-Johnson syndrome, toxic epidermal necrolysis) in pediatric patients; product should be discontinued at first sign of rash

⚠ **Bipolar disorder:** suicidal thoughts/behaviors

Evaluate:

• Therapeutic response: decrease in severity of seizures or of bipolar symptoms

Teach patient/family:

• To take PO doses divided, with or after meals to decrease adverse effects; not to discontinue product abruptly because seizures may occur

• To avoid hazardous activities until stabilized on product

• To carry emergency ID; to notify prescriber of skin rash, increased seizure activity; to use sunscreen, protective clothing if photosensitivity occurs

• To notify prescriber if pregnant, intending to become pregnant

• To notify prescriber immediately of suicidal thoughts/behaviors

• To notify prescriber if pregnancy is planned or suspected, pregnancy (C), product decreases folate, avoid breastfeeding

lansoprazole (Rx, OTC)

(lan-so-prey'zole)

Prevacid, Prevacid SoluTab

Func. class.: Antiulcer, proton pump inhibitor

Chem. class.: Benzimidazole

Do not confuse:

Prevacid/Pravachol/Prinivil

ACTION: Suppresses gastric secretion by inhibiting hydrogen/potassium ATPase enzyme system in gastric parietal cell; characterized as gastric acid pump inhibitor because it blocks the final step of acid production

USES: Gastroesophageal reflux disease (GERD), severe erosive esophagitis, poorly responsive systemic GERD, pathologic hypersecretory conditions (Zollinger-Ellison syndrome, systemic mastocytosis, multiple endocrine adenomas); possibly effective for treatment of duodenal, gastric ulcers, maintenance of healed duodenal ulcers

Unlabeled uses: GERD (infants/neonates)

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (B), breastfeeding, children

DOSAGE AND ROUTES

Frequent heartburn

• **Adult: PO (OTC)** 15 mg daily up to 14 days

Duodenal ulcer

• **Adult: PO** 15 mg/day before eating for 4 wk then 15 mg/day to maintain healing of ulcers; associated with *Helicobacter pylori*: 30 mg lansoprazole, 500 mg clarithromycin, 1 g amoxicillin bid × 14 days or 30 mg lansoprazole, 1 g amoxicillin tid × 14 days

Pathologic hypersecretory conditions

• **Adult: PO** 60 mg/day, may give up to 90 mg bid, administer doses of >120 mg/day in divided doses

GERD/esophagitis

• **Adult and adolescent: PO** 15-30 mg/day × 8 wk

• **Child 1-11 yr (>30 kg): PO** 30 mg/day ≤12 wk

• **Child 1-11 yr (≤30 kg): PO** 15 mg/day ≤12 wk

• **Infant (unlabeled): PO** 1-1.74 mg/kg/day; limited data available

• **Neonate (unlabeled): PO** 0.5-1 mg/kg/day

Stress gastric prophylaxis

• **Adult: NG** Use 30 mg oral cap or 30 mg disintegrating tab

Available forms: Del rel caps 15, 30 mg; orally disintegrating tabs 15, 30 mg

Administer:

PO route

• Swallow caps whole 30 min before eating; do not crush or chew caps; caps may be opened and contents sprinkled on food

NG route

• **Oral cap:** open cap and pour 1/4 of granules into NG feeding syringe with plunger removed, slowly add water and depress plunger, repeat until all granules used; flush tube with 15 ml water

• Place on tongue, allow to dissolve, use without regard to water

• **Oral syringe:** dissolve 15 mg/4 ml or 30 mg/10 ml water, use extra water in syringe to remove all of the product

NG tube

• **Oral disintegrating tab:** mix 30 mg tab in 10 ml water, give via NG tube, flush tube with 10 ml sterile water, clamp for 60 min

SIDE EFFECTS

CNS: *Headache*

GI: Diarrhea, abdominal pain, vomiting, nausea, *constipation,* flatulence, acid regurgitation, anorexia, irritable colon, microscopic colitis

GU: Hematuria, glycosuria, impotence, kidney calculus, breast enlargement

PHARMACOKINETICS

Absorption after granules leave stomach 80%; plasma half-life 1 1/2-2 hr; protein binding 97%; extensively metabolized in liver; excreted in urine, feces; clearance decreased in geriatric patients, renal/hepatic impairment

INTERACTIONS

Decrease: antiplatelets, effect of—clopidogrel

Increase: lansoprazole, toxicity—fluvoxaMINE, voriconazole

Decrease: lansoprazole absorption—sucralfate

Decrease: absorption of ketoconazole, itraconazole, iron salts, calcium carbonate, atazanavir, ampicillin

Increase: hypomagnesemia—loop/thiazide diuretics

Decrease: lansoprazole effect—antimuscarinics, octreotide, H_2-blockers, misoprostol

Decrease: release of ext rel amphetamine/dextroamphetamine

• Avoid use with dasatinib, delavirdine

Drug/Herb

• Avoid use with red yeast rice, St. John's wort

NURSING CONSIDERATIONS

Assess:

• **GI system:** bowel sounds q8hr, abdomen for pain, swelling, anorexia, blood in stool, emesis

• **Hepatic studies:** AST, ALT, alk phos during treatment

• INR and prothrombin time when taking warfarin

• Magnesium: low magnesium may occur

Evaluate:

• Therapeutic response: absence of epigastric pain, swelling, fullness

Teach patient/family:

• To report severe diarrhea; product may have to be discontinued

• That hypoglycemia may occur if diabetic

• To avoid hazardous activities; that dizziness may occur

• To avoid alcohol, salicylates, ibuprofen; may cause GI irritation

RARELY USED

lanthanum (Rx)

(lan'-tha-num)

Fosrenol

Func. class.: Phosphate binder

USES: End-stage renal disease

CONTRAINDICATIONS: Hypophosphatemia, hypersensitivity

DOSAGE AND ROUTES

• **Adult: PO** 750-1500 mg/day in divided doses with meals; titrate dose q2-3wk until an acceptable phosphate level is reached; tabs should be chewed completely before swallowing; intact tabs should not be swallowed; maintenance dose 1500-3000 mg/day divided with meals

⚠ HIGH ALERT

lapatinib (Rx)

(la-pa'tin-ib)

Tykerb

Func. class.: Antineoplastic—miscellaneous

Chem. class.: Biologic response modifier, signal transduction inhibitor (STIs)

ACTION: Reversibly binds tyrosine kinase of both the epidermal growth factor receptor (ERbB1) and the human epidermal receptor type 2 (HER2) (ERbB2), blocking downstream signaling for cell proliferation

USES: Advanced metastatic breast cancer patients with tumor that overexpresses HER2 protein and who have received previous chemotherapy

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, hypersensitivity

Precautions: Geriatric patients, cardiac disease, bradycardia, hypertension, hypokalemia, hypomagnesemia, QT prolongation, pneumonitis, interstitial lung disease

Black Box Warning: Hepatic disease

DOSAGE AND ROUTES

Advanced/metastatic breast cancer with HER2 overexpression who have received previous therapy

• **Adult: PO** 1250 mg (5 tabs)/day 1 hr before or after food on days 1-21 plus capecitabine 2000 mg/m²/day in 2 divided doses on days 1-14 in a repeating 21-day cycle; continue until therapeutic response or toxicity occurs

Metastatic breast cancer with HER2 overexpression for whom hormonal therapy is indicated

• **Adult: PO** 1500 mg (6 tabs) 1 hr before food with letrozole 2.5 mg/day

Hepatic dose

• **Adult: PO** (Child-Pugh C) 750 mg/day (with capecitabine); 1000 mg/day (with letrozole)

Available forms: Tabs 250 mg

Administer:

• Once a day with water on an empty stomach, 1 hr before or after food

• Do not use with grapefruit products

SIDE EFFECTS

CNS: Fatigue, insomnia, palmar-plantar erythrodysesthesia (hand/foot syndrome)

CV: Heart failure, palpitations, QT prolongation

GI: Anorexia, diarrhea, dyspepsia, mouth ulcerations, nausea, vomiting, xerosis

HEMA: Anemia, neutropenia, thrombocytopenia

INTEG: Rash

RESP: Dyspnea, pneumonitis

PHARMACOKINETICS

Bioavailability incomplete; peak 4 hr; >99% protein bound; extensively metabolized in the liver by P450 enzymes CYP3A4, CYP3A5; elimination half-life 24 hr; steady state 6-7 days; increased half-life in hepatic disease

INTERACTIONS

⚠ **Increase:** effect of lapatinib—CYP3A4 inhibitors (amiodarone, amprenavir, aprepitant, atazanavir, chloramphenicol, clar-

ithromycin, conivaptan, dalfopristin, danazol, darunavir, delavirdine, diltiazem, efavirenz, erythromycin, estradiol, fluconazole, fluvoxaMINE, imatinib, indinavir, isoniazid, itraconazole, ketoconazole, miconazole, mifepristone, nefazodone, nelfinavir, propoxyphene, quinupristin, ritonavir, RU-486, saquinavir, telithromycin, troleandomycin, verapamil, voriconazole, zafirlukast); avoid concurrent use

⚠ Increase: QT prolongation—CYP3A4 inhibitors (amiodarone, clarithromycin, erythromycin, telithromycin, troleandomycin); class IA/III antidysrhythmics, arsenic trioxide, chlorproMAZINE, chloroquine, haloperidol, levomethadyl, mesoridazine, pentamine, thioridazine, CYP3A4 substrates (methadone, pimozide, QUEtiapine, quiNIDine, risperiDONE, terfenadine, ziprasidone)

NURSING CONSIDERATIONS

Assess:

- **Cardiac status:** ECG for QT prolongation, ejection fraction; chest pain, palpitations, dyspnea
- **Hepatic status:** liver function tests; jaundice of sclera, skin; dose should be reduced in hepatic disease

⚠ Skin toxicities NCI CTC grade ≥2 discontinue use in those with decreased left ventricular ejection fraction (LVEF) or for a LVEF that drops below institution's lower limit of normal; product may be restarted after 2 wk if LVEF recovers to normal at 1000 mg/day; restart at 1250 mg/day when toxicity improves to grade 1 or better

Perform/provide:

- Storage at room temp, away from heat

Evaluate:

- Therapeutic response: decrease in breast cancer progression

Teach patient/family:

- To take with a full glass of water, once a day, 1 hr before or after food; not to take with food or grapefruit products
- To take as directed only; if a dose is missed, to take as soon as remembered; if it is close to the next dose, to take only that dose; not to double

⚠ To report chest pain, difficulty breathing, fever, chills, sore throat, bleeding, bruising, yellow skin or eyes, severe fatigue, dizziness, palpitations to prescriber

- That other side effects that may occur, but do not need to be reported: nausea, diarrhea, heartburn, mouth sores, rash, numbness/pain in hands/feet

⚠ To use adequate contraception because the fetus could be damaged by this product (D)

latanoprost (ophthalmic)

(lah-tan'oh-prost)

Xalatan

Func. class.: Antiglaucoma agent

Chem. class.: Prostaglandin agonist

Do not confuse:

latanoprost/bimatoprost

L

ACTION:

Increases aqueous humor outflow

USES:

Increased intraocular pressure in those who have open-angle glaucoma/ocular hypertension and who do not respond to other IOP-lowering products

CONTRAINDICATIONS:

Hypersensitivity to this product, benzalkonium chloride

Precautions: Eye infections, angle-closure glaucoma, renal/hepatic function impairment, children

DOSAGE AND ROUTES

- **Adult: OPHTH** Instill 1 drop in each affected eye (conjunctival sac) every night

Available forms: Ophthalmic solution 0.005%

Administer:

Ophthalmic route

- Wash hands before and after use; contact lenses should be removed before using the product, reinsert 15 min after use; contains benzalkonium chloride,

which may be absorbed by soft contact lenses
• Tilt the head back slightly and pull the lower eyelid down with the index finger to form a pouch; squeeze the prescribed number of drops into the pouch and gently close the eyes for 1–2 min; do not blink; to avoid contamination, do not touch the tip of the dropper to the eye, fingertips, or other surface
• The solution may be used concomitantly with other topical ophthalmic drug products to lower IOP; if more than one topical ophthalmic drug is being used, the drugs should be administered at least 5 min apart
• Store unopened bottle refrigerated; once opened, it may be stored at room temperature, protected from light, for up to 6 wk

SIDE EFFECTS

EENT: *Conjunctival hyperemia, iris color change, ocular pruritus*, xerophthalmia, visual disturbance, ocular irritation burning, foreign body sensation, ocular pain, blepharitis, cataracts, and superficial punctate keratitis
INTEG: Rash
MISC: Flulike symptoms

PHARMACOKINETICS

Ophthalmic: Onset 3-4 hr, peak 8-12 hr; half-life 3 hr

NURSING CONSIDERATIONS

Assess:
• **Intraocular pressure:** in those with on-going increased IOP
Evaluate:
• Decreasing IOP
Teach patient/family:
Ophthalmic route
• To wash hands before and after use; that contact lenses should be removed before using product, reinsert 15 min after use; contains benzalkonium chloride, which may be absorbed by soft contact lenses
• To tilt the head back slightly and pull the lower eyelid down with the index finger to form a pouch; squeeze the prescribed number of drops into the pouch and gently close the eyes for 1–2 min; not to blink; to avoid contamination, do not touch the tip of the dropper to the eye, fingertips, or other surface
• That the solution may be used concomitantly with other topical ophthalmic drug products to lower IOP; if more than one topical ophthalmic drug is being used, the drugs should be administered at least 5 minutes apart
• To store unopened bottle refrigerated; that once opened, it may be stored at room temperature, protected from light, for up to 6 wk

leflunomide (Rx)

(leh-floo'noh-mide)
Arava
Func. class.: Antirheumatic (DMARDs)
Chem. class.: Immune modulator, pyrimidine synthesis inhibitor

ACTION: Inhibits an enzyme involved in pyrimidine synthesis; has antiproliferative, antiinflammatory effect

USES: RA: to reduce disease process and symptoms
Unlabeled uses: Juvenile RA

CONTRAINDICATIONS: Breastfeeding, hypersensitivity, jaundice, lactase deficiency, hepatic disease
Black Box Warning: Pregnancy (X)
Precautions: Children, renal disorders, vaccinations, infection, alcoholism, immunosuppression
Black Box Warning: Hepatic disease

DOSAGE AND ROUTES

Rheumatoid arthritis
• **Adult: PO** Loading dose 100 mg/day × 3 days, maintenance 20 mg/day; may be

decreased to 10 mg/day if not well tolerated

Juvenile rheumatoid arthritis (unlabeled)

- **Adolescent and child >40 kg: PO** 20 mg
- **Adolescent and child 20-40 kg: PO** 15 mg
- **Adolescent and child 10-19.9 kg: PO** 10 mg

Available forms: Tabs 10, 20 mg

Administer:

- Give loading dose of 100 mg/day × 3, then 20 mg/day; decrease to 10 mg/day if poorly tolerated
- With food for GI upset
- **Drug elimination:** give cholestyramine 8 g tid × 11 days, check levels

SIDE EFFECTS

CNS: *Headache,* dizziness, insomnia, depression, paresthesia, anxiety, migraine, neuralgia

CV: Palpitations, hypertension, chest pain, angina pectoris, peripheral edema

EENT: Pharyngitis, oral candidiasis, stomatitis, dry mouth, blurred vision

GI: *Nausea, anorexia, vomiting, constipation, flatulence, diarrhea, elevated LFTs,* hepatotoxicity

HEMA: Anemia, ecchymosis, hyperlipidemia

INTEG: Rash, pruritus, alopecia, acne, hematoma, herpes infections

RESP: Pharyngitis, rhinitis, bronchitis, cough, respiratory infection, pneumonia, sinusitis, interstitial lung disease

SYST: Opportunistic/fatal infections

PHARMACOKINETICS

Metabolized in liver to active metabolite, half-life of metabolite 2 wk, excreted in urine

INTERACTIONS

Increase: NSAID effect—NSAIDs

Increase: hepatotoxicity—hepatotoxic agents, methotrexate

Increase: rifampin levels—rifampin

Decrease: antibody response—live virus vaccines

Decrease: leflunomide effect—activated charcoal, cholestyramine, use for overdose

NURSING CONSIDERATIONS

Assess:

- Screen for latent TB before starting treatment; if TB is present, pretreat before using product
- **Interstitial lung disease:** increased or worsening cough, SOB, fever; product may need to be discontinued
- **Arthritic symptoms:** ROM, mobility, swelling of joints at baseline and during treatment

Black Box Warning: Hepatic studies: if ALT elevations are > 2× ULN, reduce dose to 10 mg/day, monitor monthly or more frequently

- CBC with differential monthly × 6 mo, then q 6-8 wk thereafter; pregnancy test; serum electrolytes

⚠ Infections: fatal infections can occur

- B/P, weight; edema can occur

Black Box Warning: Pregnancy (X): determine that patient is not pregnant before treatment; not to be given to women of child-bearing potential that are not using reliable contraception

Evaluate:

- Therapeutic response: decreased inflammation, pain in joints

Teach patient/family:

- That product must be continued for prescribed time to be effective, that up to a month may be required for improvement
- To take with food, milk, or antacids to avoid GI upset; to take at same time of day
- To use caution when driving because drowsiness, dizziness may occur
- To take with a full glass of water to enhance absorption, may continue with correct prescribed treatment with other anti-inflammatories

Black Box Warning: Not to become pregnant (X) while taking this product; not to breastfeed while taking this product; men should also discontinue product and begin leflunomide removal protocol if pregnancy is planned

- That hair may be lost; review alternatives
- To avoid live virus vaccinations during treatment
- To notify prescriber of weight loss
- Overdose treatment: give cholestyramine tid × 24 hr or activated charcoal

letrozole (Rx)

(let'tro-zohl)

Femara

Func. class.: Antineoplastic, nonsteroidal aromatase inhibitor

ACTION: Binds to the heme group of aromatase; inhibits conversion of androgens to estrogens to reduce plasma estrogen levels

USES: Early, advanced, or metastatic breast cancer in postmenopausal women who are hormone receptor positive
Unlabeled uses: Infertility, idiopathic short stature, constitutional delayed puberty

CONTRAINDICATIONS: Pregnancy (D), premenopausal females, hypersensitivity
Precautions: Respiratory/hepatic disease, osteoporosis

DOSAGE AND ROUTES

- **Adult: PO** 2.5 mg/day

Infertility (unlabeled)

- **Adult: PO** 2.5, 5, 7.5 mg/day × 5 days, usually days 3-7 of menstrual cycle

Idiopathic short stature, constitutional delayed puberty (unlabeled)

- **Adolescent and child ≥9 (male): PO** 2.5 mg/day; use with testosterone for delayed puberty

Available forms: Tabs 2.5 mg
Administer:

- Without regard to meals; with small glass of water
- May administer biphosphates to increase bone density

SIDE EFFECTS

CNS: *Headache, lethargy,* somnolence, dizziness, depression, anxiety
CV: Angina, MI, CVA, thromboembolic events, hypertension, peripheral edema
GI: *Nausea, vomiting, anorexia,* constipation, heartburn, diarrhea
GU: Endometrial cancer, vaginal bleeding, endometrial proliferation disorders
INTEG: *Rash, pruritus,* alopecia, sweating
MISC: Hot flashes, night sweats, second malignancies, anaphylaxis, angioedema
MS: Arthralgia, arthritis, bone fracture, myalgia, osteoporosis
RESP: Dyspnea, cough

PHARMACOKINETICS

Metabolized in liver, excreted in urine, peak 2 days, terminal half-life 48 hr, steady state 2-6 wk

INTERACTIONS

Decrease: letrozole effect—estrogens, oral contraceptives

NURSING CONSIDERATIONS

Assess:

- Hepatic studies before, during therapy (bilirubin, AST, ALT, LDH) as needed or monthly

Evaluate:

- Therapeutic response: decrease in size of tumor

Teach patient/family:

- To report allergic reactions (rash; hives; difficulty breathing; tightness in chest; swelling of mouth, face, lips, tongue)
- To report vaginal bleeding, diarrhea, chest/bone pain

• To use adequate contraception in perimenopausal, recently postmenopausal women; pregnancy (D)

leucovorin (Rx)

(loo-koe-vor'in)

Func. class.: Vitamin, folic acid/methotrexate antagonist antidote

Chem. class.: Tetrahydrofolic acid derivative

Do not confuse:
leucovorin/Leukeran/leukine
folinic acid/folic acid

ACTION: Needed for normal growth patterns; prevents toxicity during antineoplastic therapy by protecting normal cells

USES: Megaloblastic or macrocytic anemia caused by folic acid deficiency, overdose of folic acid antagonist, methotrexate/pyrimethamine/ trimetrexate/trimethoprim toxicity, pneumocystosis, toxoplasmosis

CONTRAINDICATIONS: Hypersensitivity to this product or folic acid, benzyl alcohol; anemias other than megaloblastic not associated with vit B_{12} deficiency

Precautions: Pregnancy (C), neonates, breastfeeding, geriatric patients, seizures, stomatitis, vomiting

DOSAGE AND ROUTES

Megaloblastic anemia caused by enzyme deficiency

• **Adult and child: PO/IV/IM** up to 6 mg/day

Megaloblastic anemia caused by deficiency of folate

• **Adult and child: IM** ≤1 mg/day until adequate response

Methotrexate toxicity/leucovorin rescue

• **Adult and child: PO/IM/IV Normal elimination** given 6 hr after dose of methotrexate (10 mg/m²) until methotrexate $<5 \times 10^{-8}$ m, CCr >50% above prior level, or methotrexate level 5×10^{-8} m at 24 hr or $>9 \times 10^{-8}$ m at 48 hr; give leucovorin 100 mg/m² q3hr until level drops to $<10^{-8}$ m

Pyrimethamine/trimethoprim toxicity

• **Adult and child: PO/IM** 5-15 mg/day

Advanced colorectal cancer

• **Adult: IV** 200 mg/m², then 5-FU 370 mg/m² or leucovorin 20 mg/m², then 5-FU 425 mg/m²; give daily × 5 days q4-5wk

Available forms: Tabs 5, 10, 15, 25 mg; inj 3, 5 mg/ml; powder for inj 10 mg/ml

Administer:

• Within 1 hr of folic acid antagonist
• Do not give concurrently with systemic methotrexate

IM route

• No reconstitution needed
• For treatment of megaloblastic anemia

IV route

• Reconstitute 50 mg/5 ml bacteriostatic or sterile water for inj (10 mg/ml) or (100 mg/10 ml); use immediately if sterile water used

Direct IV route

• Give over 160 mg/min or less (16 ml of 10 mg/ml sol/min)

Intermittent IV INF route

• Give after diluting in 100-500 ml of 0.9% NaCl, D_5W, $D_{10}W$, LR, Ringer's sol

Y-site compatibilities: Amifostine, aztreonam, bleomycin, cefepime, CISplatin, cladribine, cyclophosphamide, DOXOrubicin, DOXOrubicin liposome, filgrastim, fluconazole, fluorouracil, furosemide, granisetron, heparin, methotrexate, metoclopramide, mitoMYcin, piperacillin/tazobactam, tacrolimus, teniposide, thiotepa, vinBLAStine, vinCRIStine

SIDE EFFECTS

HEMA: Thrombocytosis (intraarterial)
INTEG: Rash, pruritus, erythema, urticaria
RESP: Wheezing

INTERACTIONS

Increase: metabolism of barbiturates, hydantoins, primidone
Decrease: effect of—sulfamethoxazole, trimethoprim

NURSING CONSIDERATIONS

Assess:
- CCr, creatinine before leucovorin rescue, daily to detect nephrotoxicity; methotrexate level
- I&O; urine pH q6hr, maintain >7 to prevent neurotoxicity; watch for nausea and vomiting
- **Other products taken:** alcohol, hydantoins, trimethoprim may cause increased folic acid use by body
- Neurologic status (rescue): weakness, fatigue
- Monitor calcium levels
- Megaloblastic anemia, plasma lactic acid, leticulocyte count, Hct, Hgb
- **Hypersensitivity:** rash, urticaria, wheezing; notify prescriber

Perform/provide:
- Increased fluid intake if used to treat folic acid inhibitor overdose
- Protection from light and heat

Evaluate:
- Therapeutic response: increased weight; improved orientation, well-being; absence of fatigue; reversal of toxicity (methotrexate, folic acid antagonist overdose)

Teach patient/family:
- **For leucovorin rescue** to drink 3 L fluid/day of rescue
- **For folic acid deficiency,** to eat folic-acid–rich foods: bran; yeast; dried beans; nuts; fresh, green leafy vegetables
- To take product exactly as prescribed
- To notify prescriber of side effects
- To report signs of hyposensitivity reaction immediately
- To avoid breastfeeding

⚠ HIGH ALERT

leuprolide (Rx)

(loo-proe'lide)

Eligard, Lupron Depot, Lupron Depot-Ped, Viadur

Func. class.: Antineoplastic hormone
Chem. class.: Gonadotropin-releasing hormone

Do not confuse:
Lupron/Nuprin/Lopurin

ACTION: Causes initial increase in circulating levels of LH, FSH; continuous administration results in decreased LH, FSH; in men, testosterone is reduced to castrate levels; in premenopausal women, estrogen is reduced to menopausal levels

USES: Metastatic prostate cancer (inj implant), management of endometriosis, central precocious puberty, uterine leiomyomata (fibroids)
Unlabeled uses: Breast cancer, recurrent priapism, benign prostatic hyperplasia

CONTRAINDICATIONS: Pregnancy (X), breastfeeding, hypersensitivity to GnRH or analogs, thromboembolic disorders, undiagnosed vaginal bleeding; Viadur implant or Eligard should not be used in women, children
Precautions: Edema, hepatic disease, CVA, MI, seizures, hypertension, diabetes mellitus, CHF, depression, osteoporosis, spinal cord compression, urinary tract obstruction

DOSAGE AND ROUTES

Prostate cancer
- **Adult: SUBCUT** 1 mg/day; **IM** 7.5 mg/dose monthly; Viadur implant (72 mg) yearly; or **IM** 22.5 mg q3mo; or **IM** 30 mg q4mo; or IM 45 mg q6mo

Endometriosis/fibroids
- **Adult: IM** 3.75 mg monthly for 6 mo or 11.25 q3mo for 6 mo or 30 mg q4mo

Central precocious puberty

- **Child: SUBCUT** 50 mcg/kg/day; may increase by 10 mcg/kg/day as needed
- **Child >37.5 kg: IM** 15 mg q4wk
- **Child 25-37.5 kg: IM** 11.25 mg q4wk
- **Child ≤25 kg:** 7.5 mg q4wk

Benign prostatic hyperplasia (BPH) (unlabeled)

- **Adult: SUBCUT** (sol for inj) 1 mg/day, must be cont; IM (inj susp) 3.75 mg q28day × 24 wk

Available forms: Powder for inj depot 1 mo 3.75 mg, depot 3 mo/1.25 mg, 22.5 mg; depot 4 mo 30 mg; depot 6 mo 45 mg; depot-ped 7.5, 11.25, 15 mg; sol for inj 1 mg/0.2 ml; susp for inj 7.5, 22.5, 30, 45 mg; implant (Viadur) 65 mg

Administer:

- **SUBCUT:** No dilution needed if patient self-administering; make sure patient using syringes provided by manufacturer
- **Viadur DUROS Implant:** Insert in inner aspect of arm, remove after 12 mo
- **SUBCUT: Eligard:** bring to room temperature, once mixed, give within 30 min, prepare the 2 syringes for mixing, join the 2 syringes together by pushing in and twisting until secure; mix the product by pushing the contents of both syringes back and forth between syringes until uniform; should be light tan to tan, hold syringes vertically with syringe B on the bottom, draw entire mixed product into syringe B (short, wide syringe) by depressing the syringe A plunger and slightly withdrawing syringe B plunger, uncouple syringe A, while pushing down on syringe A plunger, small air bubbles will remain, hold syringe B upright, remove pink cap, attach needle cartridge to the end of syringe B, remove needle cover, give by subcut

IM route

- **Monthly:** reconstitute single-use vial with 1 ml of diluent; if multiple vials used, withdraw 0.5 ml, inject into each vial (1 ml); withdraw all, inject at 90-degree angle (3.75 mg)
- **3-month:** reconstitute microspheres using 1.5 ml of diluent, inject into vial; shake, withdraw, inject
- **12-month:** insert into upper arm; at the end of 12 months, implant must be removed

SIDE EFFECTS

CNS: Memory impairment, depression, seizures

CV: MI, PE, dysrhythmias, peripheral edema

GI: Nausea, vomiting, anorexia, diarrhea, GI bleeding

GU: Edema, hot flashes, impotence, decreased libido, amenorrhea, vaginal dryness, gynecomastia, profuse vaginal bleeding

INTEG: Alopecia

MS: Bone pain

RESP: Dyspnea, pulmonary fibrosis, interstitial lung disease

PHARMACOKINETICS

SUBCUT: Onset 1-2 wk; peak 2-4 wk; absorbed rapidly (SUBCUT), slowly (IM depot); half-life 3 hr

INTERACTIONS

Increase: antineoplastic action—flutamide, megestrol

Drug/Herb

- Do not use with black cohosh or chaste tree fruit, may interfere with treatment

NURSING CONSIDERATIONS

Assess:

- **Prostate cancer:** increased bone pain for first 4 wk of treatment; those with metastases in spinal column may exhibit severe back pain
- **Symptoms of endometriosis** (lower abdominal pain)/**fibroids** (pelvic pain, excessive vaginal bleeding, bloating) before, during, after treatment
- **Central precocious puberty (CPP)** diagnosis should have been confirmed by secondary S_4 characteristics in children <9 yr, estradiol/testosterone levels, GnRH test, tomography of head, adrenal steroids, chorionic gonadotropin, wrist x-ray, height, weight

• Hepatic studies before, during therapy (bilirubin, AST, ALT, LDH) monthly, as needed; PSA, calcium, testosterone with prostate cancer; bone mineral density; blood glucose, HbA1c
• Pituitary gonadotropic and gonadal function during therapy and 4-8 wk after therapy decreased
• **Tumor flare:** worsening of signs and symptoms; normal during beginning therapy
• Fatigue, increased pulse, pallor, lethargy; edema in feet, joints; stomach pain
⚠ **Severe allergic reaction:** rash, pruritus, urticaria, purpuric skin lesions, itching, flushing

Perform/provide:
• Storage in tight container at room temp

Evaluate:
• Therapeutic response: decreased tumor size and spread of malignancy; decrease in lesions, pain with endometriosis, fibroids, correction of CPP; increased follicle maturation

Teach patient/family:
• To notify prescriber if menstruation continues; menstruation should stop
• To notify prescriber if pregnancy is planned or suspected (X), avoid breastfeeding
• That bone pain will disappear after 1 wk
• To report any complaints, side effects to nurse, prescriber; hot flashes may occur; record weight, report gain of >2 lb/day
• How to prepare, give; to rotate sites for SUBCUT inj
• To keep accurate records of dose
• **That tumor flare may occur:** increase in size of tumor, increased bone pain, will subside rapidly; may take analgesics for pain
• That voiding problems may increase during beginning of therapy but will decrease in several weeks

levalbuterol (Rx)

(lev-al-byoo'ter-ole)

Xopenex, Xopenex HFA

Func. class.: Bronchodilator, adrenergic β_2-agonist

ACTION: Causes bronchodilation by action on β_2 (pulmonary) receptors by increasing levels of cAMP, which relaxes smooth muscle; produces bronchodilation, CNS, cardiac stimulation as well as increased diuresis and gastric acid secretion

USES: Treatment or prevention of bronchospasm (reversible obstructive airway disease)

CONTRAINDICATIONS: Hypersensitivity to sympathomimetics, this product, albuterol

Precautions: Pregnancy (C), breastfeeding, hyperthyroidism, diabetes mellitus, hypertension, prostatic hypertrophy, angle-closure glaucoma, seizures, renal disease, QT prolongation, tachydysrhythmias, severe cardiac disease, hypokalemia

DOSAGE AND ROUTES

• **Adult/child ≥12 yr: INH** 0.63 mg tid q6-8hr by nebulization, may increase 1.25 mg q8hr
• **Adult/adolescent/child >4 yr:** (HFA, metered dose) 90 mcg (2 **INH**) q4-6hr
• **Child 6-11 yr: INH** 0.31 mg tid by nebulization, max 0.63 mg tid

Available forms: Sol, inh pediatric 0.31/3 ml; 0.63 mg, 1.25 mg/3 ml; 45 mcg per actuation (HFA)

Administer:
• Every 6-8hr; wait ≥1 min between inhalation of aerosols

Inhalation route
• Shake well before use, use a spacer device, prime with 4 test sprays in new canister or when not used for >3 days

SIDE EFFECTS

CNS: *Tremors, anxiety,* insomnia, *headache,* dizziness, stimulation, *restlessness,* irritability, weakness
CV: Palpitations, tachycardia, hypertension, angina, hypotension, dysrhythmias, QT prolongation
EENT: Dry nose, irritation of nose and throat, rhinitis
GI: Heartburn, nausea, vomiting, diarrhea
INTEG: Rash
META: *Hypokalemia, hyperglycemia*
MS: Muscle cramps
RESP: Cough
SYST: Anaphylaxis, angioedema

PHARMACOKINETICS

Metabolized in the liver and tissues; crosses placenta, breast milk, blood-brain barrier; half-life 3.3-4 hr
INH sol: Onset 10-17 min, peak 1½ hr, duration 5-6 hr; **INH aerosol:** onset 4.5-10.2 min, peak 76-78 min, duration ≤6 hr

INTERACTIONS

Increase: QT prolongation—Class IA, III antidysrhythmics, usually at high doses or hypokalemia
Increase: action of aerosol bronchodilators
Increase: levalbuterol action—tricyclics, MAOIs, other adrenergics
Decrease: levalbuterol action—other β-blockers, severe bronchospasm may occur

Drug/Herb
Increase: stimulation—black/green tea, coffee, cola nut, guarana, yerba maté

NURSING CONSIDERATIONS

Assess:
• **Respiratory function:** vital capacity, forced expiratory volume, ABGs, lung sounds, heart rate and rhythm (baseline); character of sputum: color, consistency, amount
• Cardiac status: palpitations, increase/decrease in B/P, dysrhythmias
⚠ For evidence of allergic reactions, paradoxic bronchospasm, anaphylaxis, angioedema

Evaluate:
• Therapeutic response: absence of dyspnea, wheezing after 1 hr; improved airway exchange, ABGs

Teach patient/family:
• Not to use OTC medications because excess stimulation may occur
• To avoid getting aerosol in eyes because blurring may result
• To avoid smoking, smoke-filled rooms, persons with respiratory infections
⚠ That paradoxic bronchospasm may occur; to stop product immediately, contact prescriber
• To limit caffeine products such as chocolate, coffee, tea, colas, and herbs such as cola nut, guarana, yerba maté
• To use this product first if using other inhalers; to wait 5 min or more between products; to rinse mouth with water after each dose to prevent dry mouth

TREATMENT OF OVERDOSE:

Administer a β_1-adrenergic blocker

levETIRAcetam (Rx)

(lev-eh-teer-ass'eh-tam)
Keppra, Keppra XR
Func. class.: Anticonvulsant

Do not confuse:
Keppra/Kaletra

ACTION: Unknown; may inhibit nerve impulses by limiting influx of sodium ions across cell membrane in motor cortex

USES: Adjunctive therapy for partial-onset seizures, primary generalized tonic-clonic seizures
Unlabeled use: Pediatrics

CONTRAINDICATIONS: Hypersensitivity, breastfeeding

Precautions: Pregnancy (C), children, geriatric patients, renal/cardiac disease, psychosis

DOSAGE AND ROUTES

Adjunctive treatment of partial seizures

• **Adult/adolescent ≥16 yr: IV** 500 mg bid, may be titrated by 1000 mg/day q2wk, max 3000 mg/day in divided doses; **EXT REL** 1000 mg/day, may increase q2wk, max 3000 mg/day

• **Adolescent <16 yr/child/infant: PO** 10 mg/kg bid, increase daily dose q2wk by 20 mg/kg to dose of 30 mg/kg bid; if patient unable to tolerate, may reduce dose

Myoclonic seizures/tonic-clonic seizures/partial seizures

• **Adult/adolescent ≥16 yr: PO/IV** 500 mg bid, may increase by 1000 mg/day q2wk, max 3000 mg/day

Renal dose

• **Adult: PO** CCr 50-80 ml/min, 500-1000 mg q12hr or **EXT REL** 1000-2000 q24hr, max 2000 mg/day; CCr 30-49 ml/min, 250-750 mg q12hr or **EXT REL** 500-1500 mg q24hr, max 1500 mg/day; CCr <30 ml/min, 250-500 mg q12hr or **EXT REL** 500-1000 q24hr, max 1000 mg/day

Available forms: Tabs 250, 500, 750, 1000 mg; oral sol 100 mg/ml; sol for inj 100 mg/ml; ext rel tab 500, 750 mg

Administer:

PO route

• Swallow tab whole; do not break, crush, or chew

• With food, milk to decrease GI symptoms (rare)

• **Child:** <20 kg should be given oral solution; use calibrated device

Intermittent IV INF route

• Single-use vials: dilute in 100 ml of 0.9% NaCl, D_5, LR; give over 15 min, discard unused vial contents, do not use product with particulates or discoloration

Additive compatibilities: diazepam, LORazepam, valproate

SIDE EFFECTS

CNS: Dizziness, somnolence, asthenia, psychosis, suicidal ideation, nonpsychotic behavioral symptoms

HEMA: Lowered Hct, Hgb, RBC, infection

MISC: Infection, abdominal pain, pharyngitis

SYST: Stevens-Johnson syndrome, toxic epidermal necrolysis

PHARMACOKINETICS

Rapidly absorbed; not protein bound; excreted via kidneys 66% unchanged; half-life 6-8 hr, longer in geriatric patients or with renal disease

INTERACTIONS

• Avoid use with alcohol

• Possible increased carBAMazepine toxicity: carBAMazepine

Decrease: levETIRAcetam absorption—sevelamer; separate by 1 hr before, 3 hr after sevelamer

Drug/Lab Test

Increase: eosinophils

NURSING CONSIDERATIONS

Assess:

• **Seizures:** type, location, duration, character; provide seizure precautions

• Renal studies: urinalysis, BUN, urine creatinine q3mo

• Blood studies: RBC, Hct, Hgb

⚠ Mental status: mood, sensorium, affect, behavioral changes, **suicidal thoughts/behaviors;** if mental status changes, notify prescriber

Perform/provide:

• Storage at room temp (PO)

• Diluted preparation stable for 24 hr at room temp in polyvinyl bags

• Assistance with ambulation during early part of treatment; dizziness occurs

Evaluate:

• Therapeutic response: decreased seizure activity; document on patient's chart

Teach patient/family:
- To carry emergency ID stating patient's name, products taken, condition, prescriber's name, phone number
- How to use oral sol; if trouble swallowing, measure oral sol in medicine cup or dropper, do not use teaspoon
- To notify prescriber if pregnant, intending to become pregnant
- To avoid driving, other activities that require alertness
- Not to discontinue medication quickly after long-term use because withdrawal seizure may occur
- Not to breastfeed, excreted in breast milk

levobetaxolol ophthalmic

See Appendix B

levobunolol (ophthalmic)

(lee'voe-byoo'no-lahl)

Betagan

Func. class.: Antiglaucoma

Chem. class.: β-Blocker

ACTION: Can decrease aqueous humor and increase outflows

USES: Treatment of chronic open-angle glaucoma and ocular hypertension

CONTRAINDICATIONS: Hypersensitivity, AV block, heart failure, bradycardia, sick sinus syndrome, asthma

Precautions: Abrupt discontinuation, children, pregnancy, breastfeeding, COPD, depression, diabetes mellitus, myasthenia gravis, hyperthyroidism, pulmonary disease, sulfite sensitivity, angle-closure glaucoma

DOSAGE AND ROUTES

- **Adult:** Instill 1-2 drops in the affected eyes once or twice a day (0.5% solution), bid (0.25% solution)

Available forms: Ophthalmic solution 0.25%, 0.5%

Administer:
- For ophthalmic use only
- Do not touch the tip of the dropper to the eye, fingertips, or other surface to prevent contamination
- Wash hands before and after use; tilt head back slightly and pull the lower eyelid down with the index finger to form a pouch; squeeze the prescribed number of drops into the pouch; close eyes to spread drops; to avoid excessive systemic absorption, apply finger pressure on the lacrimal sac for 1–2 min after use
- If more than one topical ophthalmic drug product is being used, the drugs should be administered at least 5 min apart
- To avoid contamination or the spread of infection, do not use dropper for more than one person
- Decreased intraocular pressure can take several weeks, monitor IOP after a month

SIDE EFFECTS

CNS: Insomnia, headache, dizziness

CV: Palpitations

EENT: Eye stinging/burning, tearing, photophobia

PULM: Bronchospasm

PHARMACOKINETICS

Onset 60 min, peak 2-6 hr, duration 24 hr

INTERACTIONS

Increase: β-blocking effect—oral β-blockers

Increase: Intraocular pressure reduction—topical miotics, dipivefrin, EPINEPHrine, carbonic anhydrase inhibitors; this may be beneficial

Increase: B/P, severe—when abruptly stopping cloNIDine

Increase: Depression of AV nodal conduction, bradycardia, or hypotension—adenosine, cardiac glycosides, disopyramide, other antiarrhythmics, class 1C antiarrhythmic drugs (flecainide, propafenone, moricizine, encainide, quiNIDine, or drugs that significantly depress AV nodal conduction
Increase: AV block nodal conduction, induce AV block—high doses of procainamide
Increase: Antihypertensive effect—other antihypertensives

NURSING CONSIDERATIONS

Assess:
⚠ **Systemic absorption:** When used in the eye, systemic absorption is common with the same adverse reactions and interactions
• **Glaucoma:** Monitor intraocular pressure
Evaluate:
• Decreasing intraocular pressure
Teach patient/family:
• That product is for ophthalmic use only
• Not to touch the tip of the dropper to the eye, fingertips, or other surface to prevent contamination
• To wash hands before and after use; tilt the head back slightly and pull the lower eyelid down with the index finger to form a pouch; squeeze the prescribed number of drops into the pouch; close eyes to spread drops; to avoid excessive systemic absorption by applying finger pressure on the lacrimal sac for 1–2 min following use
• That if more than one topical ophthalmic drug product is being used, the drugs should be administered at least 5 min apart
• To avoid contamination or the spread of infection by not using dropper for more than one person

levocabastine ophthalmic

See Appendix B

levocetirizine (Rx)

(lee-voh-she-teer′ah-zeen)
Xyzal
Func. class.: Antihistamine, low sedating
Chem. class.: H_1 histamine blocker, low sedating

ACTION: Acts on blood vessels, GI, respiratory system by competing with histamine for H_1-receptor site; decreases allergic response by blocking pharmacologic effects of histamine; minimal anticholinergic action

USES: Perennial or seasonal rhinitis, allergy symptoms, chronic idiopathic urticaria

CONTRAINDICATIONS: Breastfeeding; children 6-11 yr with renal disease; end-stage renal disease; dialysis; hypersensitivity to this product, cetirizine, hydrOXYzine
Precautions: Pregnancy (B), driving, renal disease

DOSAGE AND ROUTES

• **Adult and child ≥12 yr: PO** 2.5-5 mg/day in the evening
• **Child 6-11 yr: PO** (oral solution) 2.5 mg/day in the evening
• **Child 2-5 yr: PO** (oral solution) 1.25 mg/day in the evening
• **Geriatric: PO** 2.5-5 mg/day in the evening
Renal dose
• **Adult: PO** CCr 50-80 ml/min, 2.5 mg/day; CCr 30-50 ml/min, 2.5 mg every other day; CCr 10-30 ml/min, 2.5 mg 2×/wk; CCr <10 ml/min, do not use
Available forms: Tabs 5 mg; oral sol 2.5 mg/15 ml
Administer:
• Without regard to meals in the evening; tabs scored, may be broken in half

SIDE EFFECTS

CNS: *Drowsiness, fatigue,* asthenia, dizziness
GI: Dry mouth, increase LFTs, hepatitis
MISC: Urinary retention

PHARMACOKINETICS

Rapid absorption; peak 0.9 hr; protein binding 91%-92%; half-life 8 hr; excreted in urine 85.4%, feces 12.9%

INTERACTIONS

Increase: CNS depression—alcohol, other CNS depressants
Increase: anticholinergic/sedative effect—MAOIs, phenothiazines, tricyclics
Decrease: clearance of levocetirizine—ritonavir
Drug/Lab Test
False negative: Skin allergy tests

NURSING CONSIDERATIONS

Assess:
• **Allergy symptoms:** pruritus, urticaria, watering eyes at baseline, during treatment
• **Respiratory status:** rate, rhythm, increase in bronchial secretions, wheezing, chest tightness
• Liver function tests, serum creatinine, BUN
Perform/provide:
• Storage in tight, light-resistant container
Evaluate:
• Therapeutic response: absence of running or congested nose or rashes
Teach patient/family:
• About all aspects of product use; to notify prescriber if confusion, sedation, hypotension occur, not to exceed recommended dose
• To avoid driving, other hazardous activities if drowsiness occurs
• To avoid alcohol, other CNS depressants
• That product not recommended while breastfeeding

TREATMENT OF OVERDOSE:

Administer diazepam, vasopressors, IV phenytoin

levodopa-carbidopa (Rx)

(lee-voe-doe'pa)-(kar-bi-doe'pa)
Apo-Levocarb ✤, Atamet, Parcopa, Sinemet, Sinemet CR
Func. class.: Antiparkinson agent
Chem. class.: Catecholamine

ACTION: Decarboxylation of levodopa in periphery is inhibited by carbidopa; more levodopa is made available for transport to the brain and for conversion to dopamine in the brain

USES: Parkinson's disease, parkinsonism resulting from carbon monoxide, chronic manganese intoxication, cerebral arteriosclerosis
Unlabeled uses: Restless leg syndrome

CONTRAINDICATIONS: Hypersensitivity, malignant melanoma, history of malignant melanoma or undiagnosed skin lesions resembling melanoma
Precautions: Pregnancy (C), breastfeeding, diabetes, closed-angle glaucoma, respiratory/cardiac/renal/hepatic disease, MI with dysrhythmias, seizures, peptic ulcer, depression

DOSAGE AND ROUTES

Beginning therapy for those not taking levodopa
• **Adult: PO** 25 mg carbidopa/100 mg levodopa tid, may increase daily or every other day by 1 tab to desired response (8 tabs/day); **EXT REL** tabs 50 mg carbidopa/200 mg levodopa bid
For those not taking levodopa ER
• 50 mg carbidopa/200 mg levodopa bid
For those taking levodopa ER
• Begin treatment with 10% more levodopa/day given q4-8hr, may increase or decrease dose q3days

For those taking levodopa <1.5 g/day

• **Adult: PO** 25 mg carbidopa/100 mg levodopa tid-qid, may increase daily to desired response

For those taking levodopa >1.5 g/day

• **Adult: PO** 25 mg carbidopa/250 mg levodopa tid-qid, may increase daily to desired response

Restless leg syndrome (RLS) (unlabeled)

• **Adult: PO** 25 mg carbidopa/100 mg levodopa, 1 tab at bedtime, may repeat if awakening within 2 hr or 50 mg carbidopa/200 mg levodopa sus rel tab 1-2 tabs 1 hr before bedtime

Available forms: Tabs 10 mg carbidopa/100 mg levodopa, 25 mg carbidopa/100 mg levodopa, 25 mg carbidopa/250 mg levodopa; ext rel tab 25 mg/100 mg, 50 mg carbidopa/200 mg levodopa (Sinemet CR); oral disintegrating tab (Parcopa) 10 mg carbidopa/100 mg levodopa, 25 mg carbidopa/100 mg levodopa; 25 mg carbidopa/250 mg levodopa

Administer:

• Pyridoxine (B_6) not effective for reversing Sinemet or Sinemet CR

PO route

• Do not crush or chew **ext rel tabs;** they may be broken in half; adjust dosage to response

• **Oral disintegrating tab** by gently removing from bottle, placing on tongue and swallowing with saliva; after tab dissolves, liquid is not necessary

• With meals if GI symptoms occur; limit protein taken with product

• Only after nonselective MAOIs have been discontinued for 2 wk; if patient has been previously treated with levodopa, discontinue for at least 12 hr before change to carbidopa-levodopa

SIDE EFFECTS

CNS: *Involuntary choreiform movements, hand tremors, fatigue, headache, anxiety, twitching, numbness, weakness, confusion, agitation, insomnia, nightmares,* psychosis, hallucination, hypomania, severe depression, dizziness, impulsive behaviors, neuroleptic malignant syndrome

CV: *Orthostatic hypotension,* tachycardia, hypertension, palpitation

EENT: Blurred vision, diplopia, dilated pupils

GI: *Nausea, vomiting, anorexia, abdominal distress, dry mouth, flatulence, dysphagia,* bitter taste, diarrhea, constipation

HEMA: Hemolytic anemia, leukopenia, agranulocytosis

INTEG: Rash, sweating, alopecia

MISC: Urinary retention, incontinence, weight change, dark urine

PHARMACOKINETICS

PO: Onset 30 min, peak 1-3 hr, excreted in urine (metabolites)

EXT REL: Onset 4-6 hr

INTERACTIONS

• Hypertensive crisis: nonselective MAOIs

Increase: effects of levodopa—antacids, metoclopramide

Decrease: effects of levodopa—anticholinergics, hydantoins, papaverine, pyridoxine, benzodiazepines, antipsychotics

Drug/Lab Test

Increase: BUN, AST, ALT, bilirubin, alk phos, LDH, serum glucose

Decrease: BUN, creatinine, uric acid

False positive: urine ketones (dipstick), Coombs' test

False negative: urine glucose

False increase: urine protein

Drug/Food

Decrease: absorption of levodopa—protein

NURSING CONSIDERATIONS

Assess:

• **Parkinson's symptoms:** tremors, pill rolling, drooling, akinesia, rigidity, shuffling gait before, during treatment

- B/P, respiration; orthostatic B/P
- Mental status: affect, mood, behavioral changes, depression, complete suicide assessment
- **Toxicity:** muscle twitching, blepharospasm
- Renal, hepatic, hematopoietic tests; also for diabetes, acromegaly if on long-term therapy

Evaluate:

- Therapeutic response: decrease in akathisia/bradykinesis, tremor, rigidity, improved mood

Teach patient/family:

- To change positions slowly to prevent orthostatic hypotension
- To report side effects: twitching, eye spasms because these indicate overdose
- To use product as prescribed; if discontinued abruptly, parkinsonian crisis, neuroleptic malignant syndrome (NMS) may occur; to gradually taper
- That urine, sweat may darken
- To use physical activities to maintain mobility, lessen spasms
- That improvement may not occur for 2-4 mo; about "on-off phenomenon"

levofloxacin (Rx)

(lee-voh-floks'a-sin)

Levaquin

Func. class.: Antiinfective

Chem. class.: Fluoroquinolone

ACTION: Interferes with conversion of intermediate DNA fragments into high-molecular-weight DNA in bacteria; DNA gyrase inhibitor; inhibits topoisomerase IV

USES: Acute sinusitis, acute chronic bronchitis, community-acquired pneumonia, uncomplicated skin infections, UTI, cellulitis, prostatitis, inhalational anthrax (postexposure); acute pyelonephritis caused by *Streptococcus pneumoniae, Haemophilus influenzae, Haemophilis parainfluenzae, Moraxella catarrhalis, Escherichia coli, Serratia marcescens, Klebsiella pneumoniae, Chlamydia pneumoniae, Legionella pneumophilia, Mycoplasma pneumoniae, Enterococcus faecalis, Staphylococcus epidermidis, Staphylococcus pyogenes;* inhalation anthrax in children

Unlabeled uses: Adnexitis, Bartholin abscess, bartholinitis, cervicitis, epididymis, gastroenteritis, *H. pylori* eradication, mastitis, MAC, nongonococcal urethritis, obstetric infections, PID, plague, SARS, shigellosis, TB, typhoid fever, gonococcal infections, disseminated; otitis media, otitis externa, tonsillitis, pharyngitis, sialadenitis

CONTRAINDICATIONS: Hypersensitivity to quinolones

Precautions: Pregnancy (C), breastfeeding, children, photosensitivity, acute MI, atrial fibrillation, colitis, dehydration, diabetes, QT prolongation, myasthenia gravis, renal disease, seizure disorder, syphilis

Black Box Warning: Tendon pain/rupture, tendinitis

DOSAGE AND ROUTES

Acute bacterial exacerbation of chronic bronchitis

- **Adult: PO/IV** 500 mg q24hr × 7 days

Acute bacterial sinusitis

- **Adult: PO** 500 mg q24hr × 10-14 days or 750 mg q24hr × 5 days

Acute pyelonephritis

- **Adult: PO** 250 mg q24hr × 10 days or 750 mg q24hr × 5 days

Chronic bacterial prostitis

- **Adult: PO** 500 mg q24hr × 28 days

Postexposure inhalational anthrax

- **Adult/adolescent/child >50 kg: PO/IV** 500 mg q24hr × 60 days
- **Infant >6 mo/child <50 kg: IV** 8 mg/kg q12hr × 60 days, max 250 mg/dose

Pneumonia, community acquired

- **Adult: PO/IV** 500 mg q24hr × 7-14 days or 750 mg q24hr × 5 days

Pneumonia, nosocomial
• **Adult: PO/IV** 750 mg q24hr × 7-14 days
Skin/skin-structure infections, complicated
• **Adult: PO/IV** 750 mg q24hr × 7-14 days
Skin/skin-structure infections, uncomplicated
• **Adult: PO** 500 mg q24hr × 7-10 days
UTI, complicated
• **Adult: PO/IV** 250 mg q24hr × 10 days
UTI, uncomplicated
• **Adult: PO** 250 mg q24hr × 3 days
Plague *(Y. pestis)*
• **Adult: PO/IV** 500 mg q24hr × 10-14 days, with pneumonia 750 mg q24hr
• **Child/adolescent <50 kg: PO/IV** 8 mg/kg (max 250 mg/dose) q12hr × 10-14 days
Gonococcal infection, disseminated (unlabeled)
• **Adult: IV** 250 mg q24hr × 24-48 hr then **PO** 500 mg/day × 7 days
PID
• **Adult: IV** 500 mg q24hr × 14 days
Otitis media (unlabeled)
• **Adult: PO** 100-200 mg bid-tid × 3-14 days
• **Child 6 mo-14 yr: PO** 10 mg/kg bid × ≥10 days
Renal disease
• **Adult: PO/IV** CCr 20-49 ml/min, initial 500 mg then 250 mg q24hr; CCr 10-19 ml/min, 500-700 mg, depending on condition, then 250-500 mg q48hr
Available forms: Single-use vials 500, 750 mg; premixed flexible containers 250 mg/50 ml D_5W, 500 mg/100 ml D_5W, 750 mg/150 ml D_5W; tabs 250, 500, 750 mg; oral sol 25 mg/ml
Administer:
• Obtain C&S before treatment and periodically
• PO 4 hr before or 2 hr after antacids, iron, calcium, zinc, give fluids
• Do not use theophylline with this product; toxicity may result
• **Oral solution:** Give 1 hr before or 2 hr after food

Intermittent IV INF route
• Discard any unused sol in single-dose vial
• Dilute with 0.9% NaCl, D5W to 5 mg/ml; give over 60 min/250 mg or 90 min/750 mg or using premix; tear outer wrap at notch and remove sol container; check for leaks; close control clamps; remove cover from port at bottom of container; insert pin into port with a twist; suspend container from hanger; squeeze, release drip chamber to proper fluid level; open flow control to expel air, close clamp; regulate rate with flow control clamps

Y-site compatibilities: Alfentanil, amifostine, amikacin, aminocaproic acid, aminophylline, ampicillin, anidulafungin, atenolol, atracurium, aztreonam, bivalirudin, bleomycin, bumetanide, buprenorphine, busulfan, butorphanol, caffeine citrate, calcium gluconate, CARBOplatin, carmustine, caspofungin, cefepime, cefoTEtan, cefTAZidime, ceftizoxime, cefTRIAXone, cefuroxime, chlorproMAZINE, cimetidine, cisatracurium, CISplatin, clindamycin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, dexrazoxane, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, dolasetron, DOPamine, doripenem, doxacurium, doxycycline, droperidol, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, ertapenem, erythromycin, esmolol, etoposide, famotidine, fenoldopam, fentaNYL, filgrastim, floxuridine, fluconazole, fludarabine, fosphenytoin, gemcitabine, gentamicin, granisetron, haloperidol, hydrocortisone, HYDROmorphone, IDArubicin, ifosfamide, imipenem-cilastatin, isoproterenol, labetalol, leucovorin, levorphanol, lidocaine, linezolid, magnesium sulfate, mannitol, mechlorethamine, meperidine, mesna, methylPREDNISolone, metoclopramide, metroNIDAZOLE, midazolam, milrinone, mitoMYcin, mitoXANtrone, morphine, nalbuphine, naloxone, nesiritide, octreotide, ondansetron, oxacillin, oxaliplatin,

oxytocin, PACLitaxel, palonosetron, pancuronium, PEMEtrexed, penicillin G sodium, pentamidine, phenylephrine, plicamycin, potassium chloride, promethazine, propranolol, ranitidine, remifentanil, rocuronium, sargramostim, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiotepa, tirofiban, tobramycin, trimethoprim-sulfamethoxazole, vancomycin, vasopressin, vecuronium, verapamil, vinBLAStine, vinCRIStine, vinorelbine, voriconazole, zidovudine

Solution compatibilities: 0.9% NaCl, D_5W, D_5/0.9% NaCl, D_5LR, D_5/0.45% NaCl, sodium lactate, plasma-lyte 56/D_5W

SIDE EFFECTS

CNS: *Headache,* dizziness, *insomnia,* anxiety, seizures, *encephalopathy,* paresthesia, pseudotumor cerebri

CV: Chest pain, palpitations, vasodilation, QT prolongation

EENT: Dry mouth, visual impairment

GI: *Nausea,* flatulence, *vomiting,* diarrhea, abdominal pain, pseudomembranous colitis, hepatotoxicity

GU: Vaginitis, crystalluria

HEMA: Eosinophilia, hemolytic anemia, lymphopenia

INTEG: Rash, pruritus, *photosensitivity,* epidermal necrolysis

MISC: Hypoglycemia, hypersensitivity, tendinitis, tendon rupture

RESP: Pneumonitis

SYST: Anaphylaxis, multisystem organ failure, Stevens-Johnson syndrome

PHARMACOKINETICS

Metabolized in liver, excreted in urine unchanged, half-life 6-8 hr, peak 1-2 hr

INTERACTIONS

Black Box Warning: **Increase:** tendon rupture—corticosteroids

• Do not use with magnesium in same IV line

Increase: levofloxacin levels—probenecid

Increase: CNS stimulation, seizures—NSAIDs, foscarnet

Increase: bleeding risk—warfarin

Decrease: levofloxacin absorption—antacids containing aluminum, magnesium; sucralfate, zinc, iron, calcium

Decrease: clearance of theophylline; toxicity may result

Drug/Lab Test

Decrease: glucose, lymphocytes

NURSING CONSIDERATIONS

Assess:

• Previous sensitivity reaction

• **Signs, symptoms of infection:** characteristics of sputum, WBC $>10{,}000/mm^3$, fever; obtain baseline information before, during treatment

• C&S before beginning product therapy to identify if correct treatment initiated

⚠ **Allergic reactions, anaphylaxis:** rash, urticaria, pruritus, chills, fever, joint pain; may occur a few days after therapy begins; EPINEPHrine and resuscitation equipment should be available for anaphylactic reaction

• **Pseudomembranous colitis:** bowel pattern daily; if severe diarrhea, fever occurs, product should be discontinued

⚠ **Overgrowth of infection:** perineal itching, fever, malaise, redness, pain, swelling, drainage, rash, diarrhea, change in cough, sputum

• Renal function (BUN/creatinine)

Black Box Warning: **Tendon rupture:** discontinue product at first sign of tendon pain or inflammation, usually the Achilles tendon is affected; can occur up to few months after treatment and may require surgical repair; steroids may increase risk

Perform/provide:

• Increased fluid intake to 2 L/day to prevent crystalluria

Evaluate:

• Therapeutic response: absence of signs, symptoms of infection (WBC $<10{,}000/mm^3$, temp WNL)

Teach patient/family:
- To contact prescriber if vaginal itching; loose, foul-smelling stools; furry tongue occur (may indicate superinfection); to report itching, rash, pruritus, urticaria
- To notify prescriber of diarrhea with blood or pus
- To take product 4 hr before or 2 hr after antacids, iron, calcium, zinc products
- To complete full course of therapy
- To avoid hazardous activities until response is known
- To use frequent rinsing of mouth, sugarless candy or gum for dry mouth
- To avoid other medication unless approved by prescriber
- To prevent sun exposure or to use sunscreen to prevent phototoxicity

Black Box Warning: To notify prescriber of tendon pain, inflammation; avoid corticosteroids with this product

levofloxacin ophthalmic

See Appendix B

levothyroxine (T_4) (Rx)

(lee-voe-thye-rox'een)

Eltroxin ♣, Levothroid, Levoxyl, Synthroid, Tirosint, Unithroid

Func. class.: Thyroid hormone

Chem. class.: Levoisomer of thyroxine

Do not confuse:
Synthroid/Symmetrel

ACTION: Increases metabolic rate; controls protein synthesis; increases cardiac output, renal blood flow, O_2 consumption, body temp, blood volume, growth, development at cellular level via action on thyroid hormone receptors

USES: Hypothyroidism, myxedema coma, thyroid hormone replacement, thyrotoxicosis, congenital hypothyroidism, some types of thyroid cancer, pituitary TSH suppression

CONTRAINDICATIONS: Adrenal insufficiency, recent MI, thyrotoxicosis, hypersensitivity to beef, alcohol intolerance (inj only)

Black Box Warning: Obesity treatment

Precautions: Pregnancy (A), breastfeeding, geriatric patients, angina pectoris, hypertension, ischemia, cardiac disease, diabetes

DOSAGE AND ROUTES

Hypothyroidism
- **Adult ≤50 yr: PO** 1.7 mcg/kg/day, 6-8 wk, average dose 100-200 mcg/day; max 200 mcg/day **IM/IV** 50-100 mcg/day as single dose or 50% of usual oral dosage
- **Adult >50 yr without heart disease or <50 yr with heart disease: PO** 25-50 mcg/day, titrate q6-8wk
- **Adult >50 yr with heart disease: PO** 12.5-25 mcg/day, titrate by 12.5-25 mcg q6-8wk
- **Child >12 yr: PO** 2-3 mcg/kg/day as single dose in AM
- **Child 6-12 yr: PO** 4-5 mcg/kg/day as single dose in AM
- **Child 1-5 yr: PO** 5-6 mcg/kg/day as single dose in AM
- **Child 6-12 mo: PO** 6-8 mcg/kg/day as single dose in AM
- **Child to 6 mo: PO** 8-10 mcg/kg/day as single dose in AM

Myxedema coma
- **Adult: IV** 200-500 mcg, may increase by 100-300 mcg after 24 hr; give oral medication as soon as possible

Subclinical hypothyroidism
- **Adult: PO** 1 mcg/kg/day may be sufficient

Available forms: Powder for inj 200, 500 mcg/vial; tabs 25, 50, 88, 100, 112, 125, 137, 150, 175, 200, 300 mcg; cap (liquid filled) 13, 25, 50, 75, 88, 100, 112, 125, 137, 150 mcg

Administer:

PO route

- In AM if possible as single dose to decrease sleeplessness; at same time each day to maintain product level; take on empty stomach
- Only for hormone imbalances; not to be used for obesity, male infertility, menstrual conditions, lethargy
- Lowest dose that relieves symptoms; lower dose to geriatric patients and for those with cardiac diseases
- Crush and mix with water; nonsoy formula or breast milk for infants, children
- Separate antacids, iron, calcium products by 4 hr

Direct IV route

- IV after diluting with provided diluent 500 mcg/5 ml, 200 mcg/2 ml; shake; give through Y-tube or 3-way stopcock; give ≤100 mcg/1 min; do not add to IV inf
- Considered to be incompatible in syringe with all other products

SIDE EFFECTS

CNS: *Anxiety, insomnia, tremors,* headache, thyroid storm, excitability

CV: *Tachycardia, palpitations, angina, dysrhythmias,* hypertension, cardiac arrest

GI: Nausea, diarrhea, increased or decreased appetite, cramps

MISC: Menstrual irregularities, weight loss, sweating, heat intolerance, fever, alopecia, decreased bone mineral density

PHARMACOKINETICS

Half-life euthyroid 6-7 days, hypothyroid 9-10 days, hyperthyroid 3-4 days, distributed throughout body tissues

PO: Onset 3-5 days, peak 6-8 wk, duration 1-3 wk

IV: Onset 6-8 hr, peak 24 hr, duration unknown

INTERACTIONS

Increase: cardiac insufficiency risk—EPINEPHrine products

Increase: effects of anticoagulants, sympathomimetics, tricyclics

Decrease: levothyroxine absorption—bile acid sequestrants, orlistat, ferrous sulfate

Decrease: levothyroxine effect—estrogens, antacids, sucralfate, aluminum, magnesium, calcium, iron, rifampin, rifabutin

Drug/Herb

Decrease: thyroid hormone effect—soy

Drug/Lab Test

Increase: CPK, LDH, AST, blood glucose

Decrease: thyroid function tests

NURSING CONSIDERATIONS

Assess:

- B/P, pulse periodically during treatment
- Weight daily in same clothing, using same scale, at same time of day
- Height, growth rate of child
- T_3, T_4, FTIs, which are decreased; radioimmunoassay of TSH, which is increased; radio uptake, which is increased if patient receiving too low a dose of medication
- Patient may require decreased anticoagulant; check for bleeding, bruising
- Increased nervousness, excitability, irritability, which may indicate too high a dose of medication, usually after 1-3 wk of treatment
- Cardiac status: angina, palpitation, chest pain, change in VS

Perform/provide:

- Storage in tight, light-resistant container; sol should be discarded if not used immediately
- Withdrawal of medication 4 wk before RAIU test

Evaluate:

- Therapeutic response: absence of depression; increased weight loss, diuresis, pulse, appetite; absence of constipation, peripheral edema, cold intolerance; pale, cool, dry skin; brittle nails, alopecia, coarse hair, menorrhagia, night blindness, paresthesias, syncope, stupor, coma, rosy cheeks

Teach patient/family:
- That hair loss will occur in child, is temporary; that hypothyroid child will show almost immediate behavior/personality change
- To report excitability, irritability, anxiety, which indicate overdose
- Not to switch brands unless approved by prescriber
- That product may be discontinued after giving birth; that thyroid panel should be evaluated after 1-2 mo
- That product is not to be taken to reduce weight
- To avoid OTC preparations with iodine; to read labels; to separate antacids, iron, calcium products by 4 hr
- To avoid iodine-rich food, iodized salt, soybeans, tofu, turnips, high-iodine seafood, some bread
- That product is not a cure but controls symptoms; that treatment is lifelong, full effect may take up to 6 wk

⚠ HIGH ALERT

lidocaine (parenteral) (Rx)

(lye'doe-kane)

LidoPen Auto-Injector, Xylocaine, Xylocard ♣

Func. class.: Antidysrhythmic (Class Ib)

Chem. class.: Aminoacyl amide

ACTION: Increases electrical stimulation threshold of ventricle, His-Purkinje system, which stabilizes cardiac membrane, decreases automaticity

USES: Ventricular tachycardia, ventricular dysrhythmias during cardiac surgery, digoxin toxicity, cardiac catheterization

Unlabeled uses: Attenuation of intracranial pressure increased during intubation/endotracheal tube suctioning

CONTRAINDICATIONS: Hypersensitivity to amides, severe heart block, supraventricular dysrhythmias, Adams-Stokes syndrome, Wolff-Parkinson-White syndrome

Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, renal/hepatic disease, CHF, respiratory depression, malignant hyperthermia, myasthenia gravis, weight <50 kg

DOSAGE AND ROUTES

- **Adult: IV BOL** 50-100 mg (1-1.5 mg/kg) 25-50 mg/min, repeat q3-5min, max 300 mg in 1 hr; begin **IV INF; IV INF** 1-4 mg/min (20-50 mcg/kg/min); **IM** 200-300 mg (4.3 mg/kg) in deltoid muscle, may repeat after 1-1½ hr if needed

Available forms: ***IV INF*** 0.2% (2 mg/ml), 0.4% (4 mg/ml), 0.8% (8 mg/ml); IV ad 4% (40 mg/ml), 10% (100 mg/ml), 20% (200 mg/ml); ***IV dir*** 1% (10 mg/ml), 2% (20 mg/ml); ***IM*** 10% 300 mg/ml

Administer:
- IM inj in deltoid; aspirate to avoid intravascular administration; check IV site daily for infiltration or extravasation

IV route
- Bolus undiluted (1%, 2% only), give ≤50 mg/1 min or dilute 1 g/250-500 ml D_5W; titrate to patient response; use inf pump; pediatric inf 120 mg lidocaine/100 ml D_5W; 1-2.5 ml/kg/hr = 20-50 mcg/kg/min; use only 1%, 2% sol for IV bol

Y-site compatibilities: Alemtuzumab, alteplase, amikacin, aminophylline, amiodarone, argatroban, atropine, aztreonam, bivalirudin, bumetanide, calcium chloride/gluconate, ceFAZolin, cefotaxime, cefOXitin, cefTAZidime, ceftizoxime, cefTRIAXone, cefuroxime, chloramphenicol, cimetidine, ciprofloxacin, cisatracurium, clindamycin, cycloSPORINE, DAPTOmycin, dexamethasone, dexmedetomidine, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOPamine, doxycycline, enalaprilat, EPINEPHrine, eptifibatide, ertapenem, erythromycin,

esmolol, etomidate, famotidine, fenoldopam, fentaNYL, fluconazole, furosemide, gentamicin, granisetron, haloperidol, heparin, hydrocortisone, imipenem/cilastatin, inamrinone, insulin, isoproterenol, ketorolac, labetalol, levofloxacin, linezolid, LORazepam, magnesium sulfate, meperidine, methylPREDNISolone sodium succinate, metoclopramide, metoprolol, metroNIDAZOLE, micafungin, midazolam, morphine, nafcillin, niCARdipine, nitroglycerin, nitroprusside, norepinephrine, ondansetron, palonosetron, penicillin G potassium, phenylephrine, phytonadione, piperacillin/tazobactam, potassium chloride, procainamide, prochlorperazine, promethazine, propofol, propranolol, protamine, quinupristin/dalfopristin, ranitidine, remifentanil, sodium bicarbonate, streptokinase, tacrolimus, theophylline, ticarcillin/clavulanate, tigecycline, tirofiban, tobramycin, vancomycin, vasopressin, verapamil, vitamin B complex with C, voriconazole, warfarin

SIDE EFFECTS

CNS: *Headache, dizziness,* involuntary movement, confusion, tremor, drowsiness, euphoria, seizures, shivering
CV: *Hypotension, bradycardia,* heart block, CV collapse, arrest
EENT: Tinnitus, blurred vision
GI: Nausea, vomiting, anorexia
HEMA: Methemoglobinemia
INTEG: Rash, urticaria, edema, swelling, petechiae, pruritus
MISC: Febrile response, phlebitis at inj site
RESP: Dyspnea, respiratory depression

PHARMACOKINETICS

Half-life 8 min, 1-2 hr (terminal); metabolized in liver; excreted in urine; crosses placenta
IM: Onset 5-15 min, duration 1½ hr
IV: Onset 2 min, duration 20 min

INTERACTIONS

Increase: cardiac depression, toxicity—amiodarone, phenytoin, procainamide, propranolol
Increase: hypotensive effects—MAOIs, antihypertensives
Increase: neuromuscular blockade—neuromuscular blockers, tubocurarine
Increase: lidocaine effects—cimetidine, beta blockers, protease inhibitors, ritonavir
Decrease: lidocaine effects—barbiturates, ciprofloxacin, voriconazole
Decrease: effect of—cycloSPORINE
Drug/Lab Test
Increase: CPK

NURSING CONSIDERATIONS

Assess:
⚠ ECG continuously to determine increased PR or QRS segments; if these develop, discontinue or reduce rate; watch for increased ventricular ectopic beats, may have to rebolus; B/P
• **Blood levels:** therapeutic level, 1.5-5 mcg/ml
• I&O ratio, electrolytes (potassium, sodium, chlorine)
⚠ **Malignant hyperthermia:** tachypnea, tachycardia, changes in B/P, increased temp
• **Respiratory status:** rate, rhythm, lung fields for crackles, watch for respiratory depression; lung fields, bilateral crackles may occur with CHF; increased respiration, pulse; product should be discontinued
• **CNS effects:** dizziness, confusion, psychosis, paresthesias, convulsions; product should be discontinued
Evaluate:
• Therapeutic response: decreased dysrhythmias
Teach patient/family:
• About the use of automatic lidocaine injection device if ordered for personal use
• To report signs of toxicity

L

TREATMENT OF OVERDOSE:

O_2, artificial ventilation, ECG; administer DOPamine for circulatory depression, diazepam or thiopental for seizures; decrease product if needed

lidocaine topical

See Appendix B

linagliptin

(lin′a-glip′tin)

Tradjenta

Func. class.: Antidiabetic

Chem. class.: Didipeptidyl peptidase-4 inhibitor

ACTION: Slows the inactivation of incretin hormones. Concentrations of the active, intact hormones are increased, thereby increasing and prolonging the action of these hormones. Incretin hormones are released by the intestine throughout the day, and levels are increased in response to a meal

USES: Type 2 diabetes mellitus

CONTRAINDICATIONS: *Hypersensitivity to linagliptin,* type 1 diabetes mellitus, diabetic ketoacidosis (DKA)

Precautions: Pregnancy (category B), breastfeeding, adolescents or children <18 yr, debilitated physical condition, malnutrition, uncontrolled adrenal insufficiency, pituitary insufficiency, hypo/hyperthyroidism, diarrhea, gastroparesis, GI obstruction, ileus, female hormonal changes, high fever, severe psychological stress, uncontrolled hypercortisolism

DOSAGE AND ROUTES

• **Adult: PO** 5 mg daily; when used with a sulfonylurea or insulin; a lower dose of the sulfonylurea may be necessary to minimize the risk of hypoglycemia

Available forms: Tab 5 mg

Administer:

• Once daily; may give without regard to food

SIDE EFFECTS

CNS: Headache

EENT: Nasopharyngitis

ENDO: Hypoglycemia, hyperuricemia

GI: Body weight loss, pancreatitis

INTEG: Hypersensitivity reactions, urticaria, angioedema, exfoliative dermatitis

MISC: Arthralgia, back pain

RESP: Bronchial hyperreactivity (with bronchospasm), nasopharyngitis, cough

PHARMACOKINETICS

Extensively distributed in the tissues, protein binding is concentration-dependent, a weak to moderate inhibitor of CYP3A4, plasma terminal half life of >100 hr; effective half-life 12 hr, 90% excreted unchanged, 85% excreted via the enterohepatic system (80%) or in urine (5%) within 4 days of dosing, rapidly absorbed, peak in 1.5 hr; bioavailability 30%

INTERACTIONS

• Increased hypoglycemia: sulfonylureas, beta blockers, ACE inhibitors, angiotensin II receptor antagonists, disopyramide, guanethidine, cloNIDine, octreotide, fenfluramine, dexfenfluramine, fibric acid derivatives, monoamine oxidase inhibitors (MAOIs), FLUoxetine, salicylates

• Increased masking of the signs and symptoms of hypoglycemia: reserpine

• Increased need for dosing change: cisapride, metoclopramide, tegaserod, androgens, alcohol, lithium, quinolones

Decrease: hypoglycemic effect—dextrothyroxine, bumetanide, furosemide, ethacrynic acid, torsemide, estrogens, progestins, oral contraceptives, thyroid hormones, glucocorticoids, glucagon, carbonic anhydrase inhibitors, phenytoin, fosphenytoin, or ethotoin; atypical antipsychotics (ARIPiprazole, cloZAPine, OLANZapine, QUEtiapine, risperiDONE,

and ziprasidone), phenothiazine, niacin (nicotinic acid), triamterene, thiazide diuretics
Decrease: effect of linagliptin—CYP3A4 inducers (topiramate, rifabutin, pioglitazone, OXcarbazepine, carBAMazepine, nevirapine, modafinil, metyrapone, etravirine, efavirenz, bosentan, barbiturates, aprepitant, fosaprepitant
Drug/Herb:
Decrease: linagliptin effect—St. John's wort
Drug/Lab Test:
Increase: uric acid

NURSING CONSIDERATIONS

Assess
- **Hypo/hyperglycemia:** reaction may occur after meals, for severe hypoglycemia use IV Dextrose
- Monitor blood glucose, A1c, during treatment to determine diabetes control
- CBC baseline and periodically during treatment, report decreased blood counts

Perform/provide:
- Storage at room temperature

Evaluate:
- Improving blood glucose level, A1c; decreasing polydipsia, polyphagia, polyuria, clear sensorium, absence of dizziness

Teach patient/family:
- About the symptoms of hypo/hyperglycemia and what to do about each; to have glucagon emergency kit available, to carry sugar packets
- That product must be continued on a daily basis, about the consequences of discontinuing product abruptly; to take only as directed
- To avoid OTC products unless approved by prescriber
- That diabetes is a life-long illness, that product will not cure diabetes
- That all food in diet plan must be eaten to prevent hypoglycemia
- To carry emergency ID with prescriber, condition and medications taken
- To immediately report skin disorders, swelling, difficulty breathing, or severe abdominal pain

lindane (Rx)

(lin'dane)

Hexit ✦

Func. class.: Scabicide, pediculicide

Chem. class.: Chlorinated hydrocarbon (synthetic)

ACTION: Stimulates nervous system of arthropods, resulting in seizures, death

USES: Scabies, lice (head/pubic/body), nits in those intolerant to or who do not respond to other agents

CONTRAINDICATIONS: Hypersensitivity, patients with known seizure disorders, Norwegian (crusted) scabies

Black Box Warning: Premature neonate; inflammation of skin, abrasions, skin breaks; seizure disorder

Precautions: Pregnancy (C), breastfeeding, infants, children <10 yr, avoid contact with eyes

DOSAGE AND ROUTES

Lice
- **Adult and child: CREAM/LOTION** shampoo using 30 ml: work into lather, rub for 5 min, rinse, dry with towel; comb with fine-toothed comb to remove nits; most require 1 oz, max 2 oz

Scabies
- **Adult and child: TOP** apply 1% cream/lotion to skin, from neck to bottom of feet, toes; wash area with soap, water; remove visible crusts; apply to skin surfaces; remove with soap, water in 8-12 hr; repeat after 1 wk prn; most require 1 oz, max 2 oz

Available forms: Lotion, shampoo, cream (1%)

Administer:

• Caregivers should wear gloves less permeable to lindane, thoroughly clean hands after application; avoid natural latex gloves

• **Cream/ointment/lotion:** use for scabies only; skin should be clean without other products on it, wait 1 hr after bathing or showering before application, shake well, apply under fingernails after trimming; toothbrush can be used to apply; after application wrap toothbrush in paper and throw away; use only a single application, apply as thin layer over all skin from neck down, close bottle containing leftover lotion, throw away

• Do not cover, wash off after 8-12 hr

• Use warm, not hot, water; do not leave on >12hr

• **Shampoo:** for lice only; do not use other hair products before use; shake well; hair should be completely dry; use only enough shampoo to lightly coat hair and scalp, work into hair, do not use water; allow to remain only 4 min, rinse, lather away, towel briskly

• To scalp only; do not apply to face, lips, mouth, eyes, any mucous membrane, anus, or meatus

• Topical corticosteroids as ordered to decrease contact dermatitis; antihistamines

• Lotions of menthol or phenol to control itching

• Topical antibiotics for infection

SIDE EFFECTS

CNS: Seizures, CNS toxicity, stimulation, dizziness

INTEG: *Pruritus, rash, irritation, contact dermatitis*

PHARMACOKINETICS

Peak 6 hr, half-life 18-22 hr

INTERACTIONS

• Oils may increase absorption; if oil-based hair dressing used, shampoo, rinse, dry hair before applying lindane shampoo

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Skin for abrasions, breaks, inflammation; do not use on these areas

• **Infestation:** head, hair for lice, nits before and after treatment; if scabies present, check all skin surfaces; identify source of infection: school, family, sexual contacts

Perform/provide:

• Isolation until areas on skin, scalp have cleared, treatment completed

• Removal of nits with fine-toothed comb rinsed in vinegar after treatment; use gloves

Evaluate:

• Therapeutic response: decreased crusts, nits, brownish trails on skin, itching papules in skin folds, decreased itching after several weeks

Teach patient/family:

• To wash all inhabitants' clothing using insecticide; that preventive treatment may be required of all persons living in same house using lotion or shampoo to decrease spread of infection; to use rubber gloves when applying product

• That itching may continue for 4-6 wk

• That product must be reapplied if accidently washed off or treatment will be ineffective

• Not to apply to face; if accidental contact with eyes occurs, flush with water

• To remove product after specified time to prevent toxicity

• To treat sexual contacts simultaneously

• To check for CNS toxicity: dizziness, cramps, anxiety, nausea, vomiting, seizures

linezolid (Rx)

(line-zoe'lide)

Zyvox

Func. class.: Broad-spectrum antiinfective

Chem. class.: Oxazolidinone

Do not confuse:
Zyvox/Ziox/Zosyn

ACTION: Inhibits protein synthesis by interfering with translation; binds to bacterial 23S ribosomal RNA of the 50S subunit, thus preventing formation of the bacterial translation process in primarily gram-positive organisms

USES: Vancomycin-resistant *Enterococcus faecium* infections, nosocomial pneumonia caused by *Staphylococcus aureus* or *Streptococcus* pneumonia, uncomplicated or complicated skin and skin-structure infections, community-acquired pneumonia, *Pasteurella multocida,* viridans streptococci

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (C), breastfeeding, children, thrombocytopenia, bone marrow suppression, hypertension, hyperthyroidism, pheochromocytoma, seizure disorder, ulcerative colitis, MI, PKU, renal/GI disease

DOSAGE AND ROUTES

Vancomycin-resistant *Enterococcus faecium* infections

- **Adult/adolescent/child ≥12 yr: IV/PO** 600 mg q12hr × 14-28 days; max 1200 mg/day
- **Child <12 yr/infant/term neonate: IV/PO** 10 mg/kg q8hr × 14-28 days

Nosocomial pneumonia/complicated skin infections/community-acquired pneumonia/concurrent bacterial infection

- **Adult: IV/PO** 600 mg q12hr × 10-14 days; max 1200 mg/day
- **Child: birth-11 yr: PO** 10 mg/kg q8hr × 10-14 days

Uncomplicated skin infections

- **Adult: PO** 400 mg q12hr × 10-14 days; max 1200 mg/day
- **Adolescent: PO** 600 mg q12hr × 10-14 days; max 1200 mg/day
- **Infant preterm <7 days old: PO** 10 mg/kg q12hr × 10-14 days

Available forms: Tabs 600 mg; oral sus 100 mg/5 ml; inj 2 mg/ml

Administer:

PO route

- With/without food
- Store reconstituted oral susp at room temp, use within 3 wk

Intermittent IV INF route

- Do not use if particulate is present, yellow color is normal
- Premixed sol ready to use (2 mg/ml), give over 30-120 min; do not use IV inf bag in series connections; do not use with additives in sol; do not use with another product, administer separately, flush line before and after use

Y-site compatibilities: Acyclovir, alfentanil, amikacin, aminophylline, ampicillin, aztreonam, buprenorphine, butorphanol, calcium gluconate, CARBOplatin, ceFAZolin, cefoperazone, cefoTEtan, cefOXitin, cefTAZidime, ceftizoxime, cefuroxime, cimetidine, ciprofloxacin, cisatracurium, CISplatin, clindamycin, cyclophosphamide, cycloSPORINE, cytarabine, digoxin, furosemide, ganciclovir, gemcitabine, gentamicin, heparin, HYDROmorphone, ifosfamide, labetalol, leucovorin, levofloxacin, lidocaine, LORazepam, magnesium sulfate, mannitol, meperidine, meropenem, mesna, methotrexate, methylPREDNISolone, metoclopramide, metroNIDAZOLE, midazolam, minocycline, mitoXANtrone, morphine, nalbuphine, naloxone, nitroglycerin, ofloxacin, ondansetron, PACLitaxel, PENTobarbital, PHENobarbital, piperacillin, potassium chloride, prochlorperazine, promethazine, propranolol, ranitidine, remifentanil, SUFentanil, theophylline, ticarcillin,

tobramycin, vancomycin, vecuronium, verapamil, vinCRIStine, zidovudine
Solution compatibilities: D_5, 0.9% NaCl, LR

SIDE EFFECTS

CNS: *Headache,* dizziness, insomnia
GI: *Nausea, diarrhea,* pseudomembranous colitis, increased ALT/AST, *vomiting,* taste change, tongue-color change
HEMA: Myelosuppression
MISC: Vaginal moniliasis, fungal infection, oral moniliasis, lactic acidosis, anaphylaxis, angioedema, Stevens-Johnson syndrome

PHARMACOKINETICS

Peak 1-2 hr, terminal half-life 4-5 hr, rapidly and extensively absorbed, protein binding 31%, metabolized by oxidation of the morpholine ring

INTERACTIONS

⚠ Do not use with MAOIs (or within 2 wk) or with products that possess MAOI-like action (furazolidone, isoniazid, INH, procarbazine); hypertensive crisis may occur
⚠ **Increase:** hypertensive crisis, seizures, coma—amoxapine, maprotiline, mirtazapine, traZODone, cyclobenzaprine, tricyclics, methyldopa
Increase: serotonin syndrome—SSRIs, SNRIs, serotonin receptor agonists
Increase: effects of adrenergic agents (DOPamine, EPINEPHrine, pseudoephedrine)

Drug/Herb

• Avoid use with green tea, valerian, ginseng, yohimbine, kava, guarana, St. John's wort

Drug/Food

• Tyramine foods: avoid; increased pressor response

NURSING CONSIDERATIONS

Assess:

• CBC with differential weekly, assess for myelosuppression (anemias, leukopenia, pancytopenia, thrombocytopenia)
• **Serotonin syndrome:** at least 2 wk should elapse between discontinuing linezolid and starting serotonergic agents; assess for increased heart rate, shivering, sweating, dilated pupils, tremor, high B/P, hyperthermia, headache, confusion; if these occur, stop linezolid, administer a serotonin antagonist if needed
• **Lactic acidosis:** repeated nausea/vomiting, unexplained acidosis, low bicarbonate level; notify prescriber immediately
• **Anaphylaxis/angioedema/Stevens-Johnson syndrome:** rash, pruritus, difficulty breathing, fever; have emergency equipment nearby
• CNS symptoms: headache, dizziness
• Hepatic studies: AST, ALT
• **Diabetes mellitus:** monitor those receiving insulin or oral antidiabetics for increased hypoglycemia
⚠ **Pseudomembranous colitis:** diarrhea, abdominal pain, fever, fatigue, anorexia, possible anemia, elevated WBC, low serum albumin; stop product, usually either vancomycin or IV metroNIDAZOLE given

Evaluate:

• Therapeutic response: decreased symptoms of infection, blood cultures negative

Teach patient/family:

• If dizziness occurs, to ambulate, perform activities with assistance
• To complete full course of product therapy
• To contact prescriber if adverse reaction occurs
• To inform prescriber if SSRIs or cold products, decongestants being used
• To inform prescriber of history of hypertension
• To avoid large amounts of high-tyramine foods, drinks; provide list

liothyronine (T_3) (Rx)

(lye-oh-thye'roe-neen)

Cytomel, Triostat

Func. class.: Thyroid hormone

Chem. class.: Synthetic T_3

Do not confuse:
Cytomel/Cytotec

ACTION: Increases metabolic rates, cardiac output, O_2 consumption, body temp, blood volume, growth, development at cellular level; exact mechanism unknown

USES: Hypothyroidism, myxedema coma, thyroid hormone replacement, congenital hypothyroidism, nontoxic goiter, T_3 suppression test

CONTRAINDICATIONS: Adrenal insufficiency, MI, thyrotoxicosis, untreated hypertension

Black Box Warning: Obesity treatment

Precautions: Pregnancy (A), breastfeeding, geriatric patients, angina pectoris, hypertension, ischemia, cardiac disease, diabetes

DOSAGE AND ROUTES

- **Adult: PO** 25 mcg/day, increase by 12.5-25 mcg q1-2wk until desired response, maintenance dose 25-75 mcg/day, max 100 mcg/day
- **Geriatric: PO** 5 mcg/day, increase by 5 mcg/day q1-2wk, maintenance 25-75 mcg/day

Congenital hypothyroidism

- **Child >3 yr: PO** 50-100 mcg/day
- **Child <3 yr: PO** 5 mcg/day, increase by 5 mcg q3-4days titrated to response, infant maintenance 20 mcg/day; 1-3 yr 50 mcg/day

Myxedema, severe hypothyroidism

- **Adult: PO** 25-50 mcg then may increase by 5-10 mcg q1-2wk; maintenance dose 50-100 mcg/day

Myxedema coma/precoma

- **Adult: IV** 25-50 mcg initially, 5 mcg in geriatric patients, 10-20 mcg with cardiac disease; give doses q4-12hr

Nontoxic goiter

- **Adult: PO** 5 mcg/day, increase by 12.5-25 mcg q1-2wk; maintenance dose 75 mcg/day

Suppression test

- **Adult: PO** 75-100 mcg/day × 1 wk; radioactive ^{131}I given before and after 1-wk dose

Available forms: Tabs 5, 25, 50 mcg; inj 10 mcg/ml

Administer:

- In AM if possible as a single dose to decrease sleeplessness
- At same time each day to maintain product level
- Only for hormone imbalances; do not use for obesity, male infertility, menstrual conditions, lethargy
- Lowest dose that relieves symptoms
- Liothyronine after discontinuing other thyroid preparations
- Do not give with calcium, iron, aluminum, magnesium, soy products

SIDE EFFECTS

CNS: *Insomnia, tremors,* headache, thyroid storm

CV: *Tachycardia, palpitations, angina, dysrhythmias,* hypertension, cardiac arrest

GI: Nausea, diarrhea, increased or decreased appetite, cramps

MISC: Menstrual irregularities, weight loss, sweating, heat intolerance, fever, alopecia

PHARMACOKINETICS

PO/IV: Peak 2-3 days, duration 72 hr, half-life 2.5 days

INTERACTIONS

Increase: effects of—anticoagulants, sympathomimetics, tricyclics, amphetamines, decongestants, vasopressors

Decrease: absorption of liothyronine—cholestyramine; colestipol; calcium, iron, aluminum, magnesium products
Decrease: effects of liothyronine—estrogens
Drug/Herb
Decrease: thyroid hormone effect—soy
Drug/Lab Test
Increase: CPK, LDH, AST, PBI, blood glucose
Decrease: thyroid function tests

NURSING CONSIDERATIONS

Assess:
- B/P, pulse periodically during treatment
- Weight daily in same clothing, using same scale, at same time of day
- Height, growth rate of child
- T_3, T_4, which are decreased; radioimmunoassay of TSH, which is increased; radio uptake, which is increased if patient receiving too low a dose of medication
- Patient may require decreased anticoagulant; check for bleeding, bruising
- Increased nervousness, excitability, irritability, which may indicate too high a dose of medication, usually after 1-3 wk of treatment
- Cardiac status: angina, palpitation, chest pain, change in VS

Perform/provide:
- Removal of medication 4 wk before RAIU test

Evaluate:
- Therapeutic response: absence of depression; increased weight loss, diuresis, pulse, appetite; absence of constipation, peripheral edema, cold intolerance; pale, cool, dry skin; brittle nails; alopecia, coarse hair; menorrhagia; night blindness; paresthesia; syncope, stupor, coma

Teach patient/family:
- That hair loss will occur in child but is temporary
- To report excitability, irritability, anxiety, which indicate overdose
- Not to switch brands unless approved by prescriber
- That hypothyroid child will show almost immediate behavior/personality change
- That product is not to be taken to reduce weight
- To avoid OTC preparations with iodine; to read labels; not to take with calcium, iron, aluminum, magnesium products
- To avoid iodine-rich food, iodized salt, soybeans, tofu, turnips, high iodine seafood, some bread
- That product controls symptoms but does not cure; that treatment is lifelong

liotrix (Rx)

(lye'oh-trix)

Thyrolar, T_3/T_4

Func. class.: Thyroid hormone

Chem. class.: Levothyroxine/liothyronine (synthetic T_4, T_3)

Do not confuse:
Thyrolar/Thyrar

ACTION: Increases metabolic rates, cardiac output, O_2 consumption, body temp, blood volume, growth, development at cellular level; exact mechanism unknown

USES: Hypothyroidism, thyroid hormone replacement

CONTRAINDICATIONS: Adrenal insufficiency, MI, thyrotoxicosis

Black Box Warning: Obesity treatment

Precautions: Pregnancy (A), breastfeeding, geriatric patients, angina pectoris, hypertension, ischemia, cardiac disease, diabetes

DOSAGE AND ROUTES

- **Adult: PO** single dose of Thyrolar, 1/4 or 1/2 of adult dose, adjust as needed at 2-wk intervals
- **Geriatric: PO** 1/4 tab initially, adjust q6-8wk

Available forms: Tabs: Levothyroxine 12.5 mcg/liothyronine 3.1 mcg; levothyroxine 25 mcg/liothyronine 6.25 mcg (Thyrolar-$^1/_2$); levothyroxine 50 mcg/liothyronine 12.5 mcg (Thyrolar-1); levothyroxine 100 mcg/liothyronine 25 mcg (Thyrolar-2); levothyroxine 150 mcg/liothyronine 37.5 mcg (Thyrolar-3)

Administer:

- Separate products containing calcium, iron by ≥4 hr
- In AM if possible as a single dose to decrease sleeplessness
- At same time each day to maintain product level
- Only for hormone imbalances; do not use for obesity, male infertility, menstrual conditions, lethargy
- Lowest dose that relieves symptoms

SIDE EFFECTS

CNS: *Insomnia, tremors,* headache, thyroid storm, nervousness

CV: *Tachycardia, palpitations, angina, dysrhythmias,* hypertension, cardiac arrest

GI: Nausea, vomiting, diarrhea, increased or decreased appetite, cramps

MISC: Menstrual irregularities, weight loss, sweating, heat intolerance, fever

PHARMACOKINETICS

PO (T_4): Onset unknown, peak 1-3 wk, duration 1-3 wk, terminal half-life 6-7 days

PO (T_3): Onset unknown, peak 24-72 hr, duration 72 hr, terminal half-life 1-2 days

INTERACTIONS

Increase: effects of amphetamines, decongestants, vasopressors, anticoagulants, sympathomimetics, tricyclics, catecholamines

Decrease: absorption of liotrix—cholestyramine, colestipol

Decrease: effects of liotrix—estrogens, phenytoin, carBAMazepine, rifampin

Drug/Herb

Decrease: thyroid hormone effect—soy

Drug/Lab Test

Increase: CPK, LDH, AST, PBI, blood glucose

Decrease: thyroid function tests

NURSING CONSIDERATIONS

Assess:

- B/P, pulse periodically during treatment
- Weight daily in same clothing, using same scale, at same time of day
- Height, growth rate of child
- T_3, T_4, FTIs, which are decreased; radioimmunoassay of TSH, which is increased; radio uptake, which is increased if patient is receiving too low a dose of medication
- May require decreased anticoagulant; check for bleeding, bruising
- Increased nervousness, excitability, irritability, which may indicate too high a dose of medication, usually after 1-3 wk of treatment
- Cardiac status: angina, palpitation, chest pain, change in VS

Perform/provide:

- Withdrawal of medication 4 wk before RAIU test
- Storage in airtight, light-resistant container

Evaluate:

- Therapeutic response: absence of depression; increased weight loss, diuresis, pulse, appetite; absence of constipation, peripheral edema, cold intolerance; pale, cool, dry skin; brittle nails; coarse hair; menorrhagia; night blindness; paresthesias; syncope, stupor, coma; rosy cheeks

Teach patient/family:

- That hair loss will occur in child, is temporary
- To report excitability, irritability, chest pain, increased pulse rate, palpitations, excessive sweating, heat intolerance, nervousness, anxiety, which indicate overdose
- Not to switch brands unless approved by prescriber

- That hypothyroid child will show almost immediate behavior/personality change
- That product is not to be taken to reduce weight
- To avoid OTC preparations with iodine; read labels; separate products containing calcium, iron by ≥4 hr
- To avoid iodine food, iodized salt, soybeans, tofu, turnips, high iodine seafood, some bread
- That product does not cure but controls symptoms; treatment is lifelong

liraglutide (Rx)

(lir'a-gloo'tide)

Victoza

Func. class.: Antidiabetic agent

Chem. class.: Incretin mimetics

ACTION: Improved glycemic control and potential weight loss via activation of the glucagon-like peptide-1 (GLP-1) receptor

USES: Type 2 diabetes mellitus in combination with diet/exercise

CONTRAINDICATIONS: Hypersensitivity

Black Box Warning: Medullary thyroid carcinoma (MTC), multiple endocrine neoplasia syndrome type 2 (MEN 2), thyroid cancer

Precautions: Breastfeeding, children, geriatric patients, alcoholism, burns, cholelithiasis, type 1 diabetes mellitus, ketoacidosis, diarrhea, fever, gastroparesis, hepatic/renal disease, hypoglycemia, infection, pancreatitis, surgery, thyroid disease, trauma, vomiting

DOSAGES AND ROUTES

- **Adult: SUBCUT** 0.6 mg/day × 1 wk, then increase to 1.2 mg/day, max 1.8 mg/day

Available forms: Solution for injection 18 mg/3 ml pre-filled pen

Administer:

SUBCUT route

- Give subcut only, inspect for particulate matter, discoloration; do not use if unusually viscous, cloudy, discolored, or if particles present; give daily anytime, without regard to meals; pen needles must be purchased separately, use Novo Nordisk needle; prior to first use, prime, see manual for directions; give in thigh, abdomen, or upper arm; lightly pinch fold of skin, insert needle at 90-degree angle (45-degree angle if thin), release skin; aspiration is not needed, give over 6 sec, rotate injection sites
- If dose is missed, resume once-daily dosing at next scheduled dose

SIDE EFFECTS

CNS: Dizziness, headache
CV: Hypertension
ENDO: Hypoglycemia
EENT: Sinusitis
GI: Abdominal pain, anorexia, constipation, diarrhea, dyspepsia, nausea, vomiting, pancreatitis
INTEG: Angioedema, erythema, injection site reaction, urticaria
MS: Back pain
SYST: Antibody formation, infection, influenza, secondary thyroid malignancy, anaphylaxis

INTERACTIONS

Increase: hypoglycemic reactions—angiotensin II receptor antagonists, ACE inhibitors, other antidiabetics, β-blockers, dexfenfluramine, fenfluramine, disopyramide, FLUoxetine, fibric acid derivatives, mecasermin, MAOIs, octreotide, pegvisomant, salicylates
Increase: hyperglycemic reactions—protease inhibitors, phenothiazines, baclofen, atypical antipsychotics, corticosteroids, cycloSPORINE, tacrolimus, carbonic anhydrase inhibitors, dextrothyroxine, diazoxide, phenytoin, fosphenytoin, ethotoin, isoniazid, INH, niacin, nicotine, estrogens, progestins, oral contraceptives, growth hormones, sympathomimetics

Increase or decrease: hypoglycemic reactions—androgens, bortezomib, quinolones, cloNIDine, alcohol, lithium, pentamidine
Increase or decrease: effects of—torvastatin, acetaminophen, griseofulvin

PHARMACOKINETICS

Protein binding (98%); half-life 12-13 hr; binds to albumin, then released into circulation; peak 8-12 hr; body weight significantly affects pharmacokinetics

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Thyroid C-cell tumors; monitor during treatment

- **Hypoglycemic reactions** that may occur soon after meals: hunger, sweating, weakness, dizziness, tremors, restlessness, tachycardia
- Hypersensitivity to this product
- Serum glucose, A1c, CBC during treatment
- **Stress:** those diabetic patients exposed to stress, surgery, fever, infections may require insulin administration temporarily

⚠ **Serious skin reactions:** angioedema, pancreatitis, secondary thyroid malignancy

Perform/Provide:

- Storage: do not store pen with needle attached; avoid direct heat and sunlight; discard 30 days after first use; after first use may be stored at room temp or refrigerated, do not freeze

Evaluate:

- Therapeutic response: stable and improved serum glucose, A1C, weight loss

Teach patient/family:

- About symptoms of hypo/hyperglycemia, what to do for each; to have glucagon emergency kit available; to carry a carbohydrate source at all times
- About side effects associated with therapy, such as nausea and vomiting; that upward dose titration can be delayed or ignored, depending on tolerance
- That diabetes is a lifelong illness; that product does not cure disease and must be continued on a daily basis
- To carry emergency ID with prescriber's phone number and medications taken
- To continue with other recommendations: diet, exercise, hygiene
- To test blood glucose using a blood glucose meter
- To avoid other medications, herbs, supplements unless approved by prescriber

⚠ To report serious skin effects, abdominal pain with nausea/vomiting

- Provide patient with written instructions if self-administration is ordered

lisdexamfetamine (Rx)

(lis-dex'am-fet'a-meen)

Vyvanse

Func. class.: CNS stimulant
Chem. class.: Amphetamine

L

Controlled Substance Schedule II

ACTION: Increases release of norepinephrine, dopamine in cerebral cortex to reticular activating system

USES: Attention-deficit/hyperactivity disorder (ADHD)

CONTRAINDICATIONS: Breastfeeding, hyperthyroidism, hypertension, glaucoma, severe arteriosclerosis, CV disease, hypersensitivity to sympathomimetic amines

Black Box Warning: Substance abuse

Precautions: Pregnancy (C), children <6 yr, Gilles de la Tourette's disorder, depression, anorexia nervosa, psychosis, seizure disorder, suicidal ideation, MI, heart failure, alcoholism, aortic stenosis, bipolar disorder

DOSAGE AND ROUTES

• **Child 6-12 yr: PO** 30 mg/day, may increase by 10-20 mg/day at weekly intervals, max 70 mg/day

Available forms: Caps 30, 50, 70 mg

Administer:

• Give daily in AM
• Without regard to meals
• Caps: may take whole or opened and contents dissolved in water

SIDE EFFECTS

CNS: *Hyperactivity, insomnia, restlessness, talkativeness,* dizziness, headache, dysphoria, irritability, aggressiveness, CNS tumor, dependence, addiction, mild euphoria, somnolence, lability, psychosis, mania, hallucinations, aggression

CV: *Palpitations, tachycardia,* hypertension, decrease in heart rate, dysrhythmias, MI, cardiomyopathy

EENT: Blurred vision, mydriasis, diplopia

ENDO: Growth inhibition

GI: *Anorexia,* dry mouth, diarrhea, weight loss

GU: Impotence, change in libido

INTEG: Urticaria, angioedema, Stevens-Johnson syndrome, toxic epidermal necrolysis

PHARMACOKINETICS

Metabolized by liver; urine excretion pH dependent; crosses placenta, breast milk; half-life <1hr

INTERACTIONS

⚠ Hypertensive crisis: MAOIs or within 14 days of MAOIs

Increase: serotonin syndrome, neuroleptic malignant syndrome—SSRIs, SNRIs, serotonin-receptor agonists

Increase: lisdexamfetamine effect—acetaZOLAMIDE, antacids, sodium bicarbonate, urinary alkalinizers

Increase: CNS effect—haloperidol, tricyclics, phenothiazines, modafinil, meperidine, PHENobarbital, phenytoin

Increase: CNS stimulation—melatonin

Decrease: absorption of phenytoin

Decrease: lisdexamfetamine effect—ascorbic acid, ammonium chloride, urinary acidifiers

Decrease: effect of—adrenergic blockers, antidiabetics

Drug/Herb

• Serotonin syndrome: St. John's wort

Increase: stimulant effect—khat, melatonin, green tea, guarana

Decrease: stimulant effect—eucalyptus

Drug/Food

Increase: amine effect—caffeine

NURSING CONSIDERATIONS

Assess:

• VS, B/P; product may reverse antihypertensives; check patients with cardiac disease often
• CBC, urinalysis; in diabetes: blood glucose; insulin changes may be required because eating may decrease
• Height, growth rate in children; growth rate may be decreased
• Mental status: mood, sensorium, affect, stimulation, insomnia, irritability

⚠ **Serotonin syndrome, neuroleptic malignant syndrome:** increased heart rate, shivering, sweating, dilated pupils, tremors, high B/P, hyperthermia, headache, confusion; if these occur, stop product, administer serotonin antagonist if needed; at least 2 wk should elapse between discontinuation of serotonergic agents and start of product

• **Tolerance or dependency:** increased amount of product may be used to get same effect; will develop after long-term use
• Overdose: pain, fever, dehydration, insomnia, hyperactivity

Black Box Warning: Before giving this product, identify presence of substance abuse; high potential for abuse

Perform/provide:

• Gum, hard candy, frequent sips of water for dry mouth

Evaluate:

• Therapeutic response: increased CNS stimulation, decreased drowsiness

Teach patient/family:

- **Seizures:** product may decrease seizure threshold; those with a seizure disorder should notify prescriber if seizure occurs
- To decrease caffeine consumption (coffee, tea, cola, chocolate); may increase irritability, stimulation
- To avoid OTC preparations unless approved by prescriber
- To taper product over several weeks; depression, increased sleeping, lethargy may occur
- To avoid alcohol ingestion
- To avoid breastfeeding
- To avoid hazardous activities until stabilized on medication
- To get needed rest; patient will feel more tired at end of day
- To use as part of a comprehensive treatment program

Black Box Warning: Serious CV effects may occur from increasing dose

TREATMENT OF OVERDOSE:

Administer fluids, antihypertensive for increased B/P, ammonium chloride for increased excretion, chlorproMAZINE for antagonizing CNS effects

lisinopril (Rx)

(lyse-in'oh-pril)

Prinivil, Zestril

Func. class.: Antihypertensive, angiotensin-converting enzyme 1 (ACE) inhibitor

Chem. class.: Enalaprilat lysine analog

Do not confuse:

lisinopril/Risperdal

Prinivil/Plendil/Proventil/PriLOSEC

ACTION:

Selectively suppresses renin-angiotensin-aldosterone system; inhibits ACE, thereby preventing conversion of angiotensin I to angiotensin II

USES:

Mild to moderate hypertension, adjunctive therapy of systolic CHF, acute MI

CONTRAINDICATIONS:

Hypersensitivity, angioedema

Black Box Warning: Pregnancy (D), 2nd/3rd trimesters

Precautions: Breastfeeding, renal disease, hyperkalemia, renal artery stenosis, CHF, pregnancy (C) 1st trimester

DOSAGE AND ROUTES

Hypertension

- **Adult: PO** 10-40 mg/day; max 80 mg/day
- **Child ≥6 yr: PO** 0.07 mg/kg/day up to 5 mg/day; titrate q1-2wk up to 0.6 mg/kg/day or 40 mg/day
- **Geriatric: PO** 2.5-5 mg/day, increase q7days

CHF

- **Adult: PO** 5 mg initially with diuretics, range 5-40 mg
- **Acute myocardial infarction in adults who are hemodynamically stable: PO** give 5 mg within 24 hr of onset of symptoms, then 5 mg after 24 hr, 10 mg after 48 hr, then 10 mg daily

Renal dose

- **Adult: PO** CCr <30 ml/min, reduce dose by 50%, initially 5 mg/day, max 40 mg/day; CCr <10 ml/min, 2.5 mg/day, max 40 mg/day

Available forms: Tabs 2.5, 5, 10, 20, 30, 40 mg

Administer:

- Severe hypotension may occur after 1st dose of product; may be prevented by reducing or discontinuing diuretic therapy 3 days before beginning lisinopril therapy

SIDE EFFECTS

CNS: *Vertigo,* depression, **stroke,** insomnia, paresthesias, headache, *fatigue,* asthenia, dizziness

CV: Chest pain, hypotension, sinus tachycardia

EENT: Blurred vision, nasal congestion

GI: Nausea, vomiting, anorexia, constipation, flatulence, GI irritation, diarrhea, hepatic failure, hepatic necrosis
GU: Proteinuria, renal insufficiency, sexual dysfunction, impotence
INTEG: Rash, pruritus
MISC: Muscle cramps, hyperkalemia
RESP: Dry cough, dyspnea
SYST: Angioedema, anaphylaxis, toxic epidermal necrolysis

PHARMACOKINETICS

Onset 1 hr, peak 6-8 hr, duration 24 hr, excreted unchanged in urine, half-life 12 hr

INTERACTIONS

Increase: hyperkalemia—potassium salt substitutes, potassium-sparing diuretics, potassium supplements, cycloSPORINE
Increase: possible toxicity—lithium
Increase: hypotensive effect—diuretics, other antihypertensives, probenecid, phenothiazines, nitrates, acute alcohol ingestion
Increase: hypersensitivity—allopurinol
Decrease: lisinopril effects—aspirin, indomethacin, NSAIDs

Drug/Food

- High-potassium diet (bananas, orange juice, avocados, nuts, spinach) should be avoided; hyperkalemia may occur

Drug/Lab Test

Interference: glucose/insulin tolerance tests, ANA titer

NURSING CONSIDERATIONS

Assess:

⚠ Blood studies, platelets; WBC with differential at baseline, periodically q3mo; if neutrophils $<1000/mm^3$, discontinue treatment (recommended with collagen-vascular disease)

- Baselines of renal, hepatic studies before therapy begins, periodically; LFTs, uric acid, glucose may be increased
- **Angioedema: anaphylaxis, toxic epidermal necrolysis,** facial swelling, dyspnea, tongue swelling (rare)

Black Box Warning: Pregnancy before starting treatment; pregnancy (D)

- **Hypertension:** B/P, pulse q4hr during beginning treatment and periodically thereafter; note rate, rhythm, quality; apical/pedal pulse before administration; notify prescriber of any significant changes
- Electrolytes: potassium, sodium, chlorine
- **CHF:** edema in feet, legs daily; weight daily; dyspnea, wet crackles
- Skin turgor, dryness of mucous membranes for hydration status

Evaluate:

- Therapeutic response: decreased B/P, CHF symptoms

Teach patient/family:

- Not to discontinue product abruptly; to taper
- To rise slowly to sitting or standing position to minimize orthostatic hypotension
- To avoid increasing potassium in the diet
- To report dry cough

Black Box Warning: To report if pregnancy is planned or suspected; pregnancy (D) 2nd/3rd trimesters

TREATMENT OF OVERDOSE:

Lavage, IV atropine for bradycardia, IV theophylline for bronchospasm, digoxin, O_2, diuretic for cardiac failure

lithium (Rx)

(li'thee-um)

Carbolith ♣, Duralith ♣, Lithobid

Func. class.: Antimanic, antipsychotic
Chem. class.: Alkali metal ion salt

ACTION: May alter sodium, potassium ion transport across cell membrane in nerve, muscle cells; may balance biogenic amines of norepinephrine, serotonin in CNS areas involved in emotional responses

USES: Bipolar disorders (manic phase), prevention of bipolar manic-depressive psychosis

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, children <12 yr, hepatic disease, brain trauma, organic brain syndrome, schizophrenia, severe cardiac/renal disease, severe dehydration

Precautions: Geriatric patients, thyroid disease, seizure disorders, diabetes mellitus, systemic infection, urinary retention

Black Box Warning: Lithium level >1.5 mmol/L

DOSAGE AND ROUTES

- **Adult: PO** 300-600 mg tid, maintenance 300 mg tid or qid; **SLOW REL TABS** q300 mg bid; dose should be individualized to maintain blood levels at 1-1.5 mEq/L
- **Geriatric: PO** 300 mg bid, increase q7days by 300 mg to desired dose
- **Child: PO** 15-20 mg/kg/day in 3-4 divided doses; increase as needed; do not exceed adult doses; maintain blood levels at 0.4-0.5 mEq/L

Available forms: Caps 150, 300, 600 mg; tabs 300 mg; ext rel tabs 300, 450 mg; syr 300 mg/5 ml (8 mEq/5 ml); slow rel caps 150, 300 mg ✤

Administer:

- Do not break, crush, chew caps, ext rel tabs
- Reduced dose to geriatric patients
- With meals to avoid GI upset
- Adequate fluids (2-3 L/day) to prevent dehydration during initial treatment, 1-2 L/day during maintenance

SIDE EFFECTS

CNS: *Headache, drowsiness, dizziness,* tremors, twitching, ataxia, seizure, slurred speech, restlessness, confusion, stupor, memory loss, clonic movements, fatigue

CV: *Hypotension,* ECG changes, dysrhythmias, circulatory collapse, edema, Brugada syndrome

EENT: Tinnitus, blurred vision

ENDO: Hyponatremia, goiter, hyperglycemia, hypo/hyperthyroidism

GI: *Dry mouth, anorexia, nausea, vomiting, diarrhea,* incontinence, abdominal pain, metallic taste

GU: Polyuria, glycosuria, proteinuria, albuminuria, urinary incontinence, polydipsia

HEMA: Leukocytosis

INTEG: Drying of hair, alopecia, rash, pruritus, hyperkeratosis, acneiform lesions, folliculitis

MS: Muscle weakness

PHARMACOKINETICS

PO: Onset rapid, peak ½-12 hr, half-life 18-36 hr depending on age, crosses blood-brain barrier, 80% of filtered lithium reabsorbed by renal tubules, excreted in urine, crosses placenta, enters breast milk, well absorbed by oral method

INTERACTIONS

- **Neurotoxicity: haloperidol, thioridazine**

Increase: hypothyroid effects—antithyroid agents, calcium iodide, potassium iodide, iodinated glycerol

Increase: effects of neuromuscular blocking agents, phenothiazines

Increase: renal clearance—sodium bicarbonate, acetaZOLAMIDE, mannitol, aminophylline

Increase: masking of lithium toxicity—beta-blockers used for lithium tremor

Increase: toxicity—indomethacin, diuretics, NSAIDs, losartan

Increase: lithium effect/toxicity—carBAMazepine, FLUoxetine, methyldopa, thiazide diuretics, probenecid

Decrease: lithium effects—theophyllines, urea, urinary alkalinizers

L

Drug/Herb
• Avoid use with kava, St. John's wort, valerian
Decrease: lithium levels—black/green tea, guarana
Drug/Food
• Significant changes in sodium intake alter lithium excretion
Drug/Lab Test
Increase: potassium excretion, urine glucose, blood glucose, protein, BUN
Decrease: VMA, T_3, T_4, ^{131}I

NURSING CONSIDERATIONS

Assess:
• **Mental status:** manic symptoms, mood, behavior before, during treatment

Black Box Warning: Lithium toxicity: diarrhea, vomiting, tremor, twitching; serum lithium levels 2×/wk initially then q2mo (therapeutic level: 0.5-1.5 mEq/L); toxic level >1.5 mcg/L

• Weight daily; check for, report edema in legs, ankles, wrists
• Sodium intake; decreased sodium intake with decreased fluid intake may lead to lithium retention; increased sodium, fluids may decrease lithium retention
• Skin turgor at least daily
• Urine for albuminuria, glycosuria, uric acid during beginning treatment, q2mo thereafter
• Neurologic status: LOC, gait, motor reflexes, hand tremors
• ECG in those >50 yr with CV disease, cardiology consult is recommended in those with risk factor
Evaluate:
• Therapeutic response: decrease in excitement, manic phase
Teach patient/family:
• About **the symptoms of minor toxicity:** vomiting, diarrhea, poor coordination, fine motor tremors, weakness, lassitude; **major toxicity:** coarse tremors, severe thirst, tinnitus, diluted urine
• To monitor urine specific gravity, emphasize need for follow-up care to determine lithium levels; to monitor lithium levels to ensure effective levels and treatment
• That contraception is necessary because lithium may harm fetus (pregnancy [D]); not to breastfeed
• Not to operate machinery until lithium levels stable
• That beneficial effects may take 1-3 wk
• About products that interact with lithium (provide list); about need for adequate, stable intake of salt and fluids; not to use OTC products unless approved by prescriber

TREATMENT OF OVERDOSE:

Induce emesis or lavage, maintain airway, respiratory function; dialysis for severe intoxication

lodoxamide ophthalmic

See Appendix B

loperamide (OTC, Rx)

(loe-per'a-mide)

Anti-Diarrheal, Equaline Anti-Diarrheal, Good Sense Anti-Diarrheal, Imodium ✚, Imodium A-D, Select Brand Anti-Diarrheal, Top Care Anti-Diarrheal, Walgreens Anti-Diarrheal

Func. class.: Antidiarrheal
Chem. class.: Piperidine derivative

Do not confuse:
Imodium/Indocin
Loperamide/furosemide

ACTION: Direct action on intestinal muscles to decrease GI peristalsis; reduces volume, increases bulk; electrolytes not lost

USES: Diarrhea (cause undetermined), travelers' diarrhea, chronic diarrhea, to decrease amount of ileostomy discharge
Unlabeled uses: Irinotecan-induced diarrhea, irritable bowel syndrome

CONTRAINDICATIONS:

Hypersensitivity, pseudomembranous colitis, constipation, dysentery, GI bleeding/obstruction/perforation, ileus, vomiting

Precautions: Pregnancy (C), breastfeeding, children <2 yr, hepatic disease, dehydration, gastroenteritis, toxic megacolon, geriatric patients, severe ulcerative colitis

DOSAGE AND ROUTES

- **Adult: PO** 4 mg then 2 mg after each loose stool, max 16 mg/day
- **Child 9-11 yr: PO** 2 mg then 1 mg after each loose stool, max 6 mg/24 hr
- **Child 6-8 yr: PO** 2 mg then 0.1 mg/kg after each loose stool, max 4 mg/day
- **Child 2-5 yr: PO** 1 mg then 0.1 mg/kg after each loose stool, max 4 mg/24 hr

Irinotecan-induced diarrhea (unlabeled)

- **Adult: PO** 4 mg at first sign of late diarrhea (≥24 hr after irinotecan) then 2 mg q2hr × ≥12 hr; at night, 4 mg q4hr

Available forms: Caps 2 mg; liq 1 mg/5 ml; tabs 2 mg, chew tabs 2 mg

Administer:

- Do not break, crush, or chew caps
- For 48 hr only
- Do not mix oral sol with other sol

SIDE EFFECTS

CNS: Dizziness, drowsiness, fatigue

GI: *Nausea, dry mouth, vomiting, constipation,* abdominal pain, anorexia, toxic megacolon, bacterial enterocolitis, flatulence

INTEG: Rash

MISC: Hyperglycemia

SYST: Anaphylaxis, angioedema, toxic epidermal necrolysis

PHARMACOKINETICS

PO: Onset 1-3 hr, duration 4-5 hr, half-life 9-14 hr, metabolized in liver, excreted in feces as unchanged product, small amount in urine

INTERACTIONS

Increase: CNS depression—alcohol, antihistamines, analgesics, opioids, sedative/hypnotics

Drug/Herb

Increase: CNS depression—chamomile, hops, kava, valerian

NURSING CONSIDERATIONS

Assess:

- **Stools:** volume, color, characteristics, frequency; bowel pattern before product; rebound constipation
- Electrolytes (potassium, sodium, chlorine) if receiving long-term therapy
- Skin turgor q8hr if dehydration is suspected; fluid replacement
- Response after 48 hr; if no response, product should be discontinued
- Dehydration, CNS problems in children, those with hepatic disease
- Abdominal distention, toxic megacolon; may occur with ulcerative colitis

Perform/provide:

- Storage in tight container

Evaluate:

- Therapeutic response: decreased diarrhea (48 hr); decreased chronic diarrhea (10 days)

Teach patient/family:

- To avoid OTC products unless directed by prescriber
- That ileostomy patient may take product for extended time
- If drowsiness occurs, not to operate machinery
- To use hard candy, sips of water for dry mouth

lopinavir/ritonavir

(low-pin'ah-ver/ri-toe'na-veer)

Kaletra

Func. class.: Antiretroviral

Chem. class.: Protease inhibitor

ACTION:

Inhibits human immunodeficiency virus (HIV-1) protease and prevents maturation of the infectious virus

USES: HIV-1 in combination with or without other antiretrovirals

CONTRAINDICATIONS: Hypersensitivity to this product or polyoxyethylated castor oil (oral solution), CYP3A4 metabolized products

Precautions: Pregnancy (C), breastfeeding, hepatic disease, pancreatitis, diabetes, hemophilia, AV block, hypercholesterolemia, immune reconstitution syndrome, neonates, cardiomyopathy, congenital long-QT prolongation, hypokalemia, elderly patients, Grave's disease, polymyositis, Guillain-Barré syndrome, children, HBV/HCVCO-infection

DOSAGE AND ROUTES

HIV infection in combination with other antiretroviral agents

- **Adult: PO** 400 mg lopinavir/100 mg ritonavir bid or 800 mg lopinavir/200 mg ritonavir per day may be administered to patients with <3 lopinavir resistance–associated substitutions (L10F/I/R/V, K20M/N/R, L24I, L33F, M36I, I47V, G48V, 154L/T/V, V82A/C/F/S/T, and I84V); do not give once-daily dosing with concomitant carBAMazepine, PHENobarbital, or phenytoin; do not give as once daily dosing with efavirenz, nevirapine, (fos)amprenavir, nelfinavir
- **Pregnant adults: PO** 400 mg lopinavir/100 mg ritonavir bid, may need 600 mg lopinavir/150 mg ritonavir bid in the 2nd/3rd trimesters; once-daily dosing is not recommended; a preferred PI-based regimen for pregnant patients combines twice-daily lopinavir; ritonavir with zidovudine and either lamiVUDine or emtricitabine
- **Adult receiving concomitant efavirenz, nelfinavir, or nevirapine: PO TABS,** 500 mg lopinavir/125 mg ritonavir bid; **CAPS/SOL,** 533 mg lopinavir/133 mg ritonavir bid
- **Adolescent/child/infant >6 mo:** The once-daily regimen is not recommended in pediatric patients; capsules are not recommended for use in patients ≤40 kg; a preferred PI-based regimen for all children combines lopinavir/ritonavir with a dual NRTI; a lopinavir/ritonavir plus dual NRTI regimen is an alternative option in adolescents

Available forms: Oral solution 400 mg lopinavir/100 mg ritonavir/5 ml; tablets 100 mg lopinavir/25 mg ritonavir, 200 mg lopinavir/50 mg ritonavir, cup 133.3/33.3 mg

Administer:

PO route

- **TAB:** take without regard to food; swallow whole, do not crush, break, chew
- **CAP:** must take with food
- **ORAL SOL:** shake well, use calibrated measuring device
- Drug resistance testing should be done before beginning therapy in antiretroviral-naive patients and before changing therapy for treatment failure
- For adults and adolescents, therapy is recommended in those with a CD4 ≤500/mm^3, who is pregnant, who has HIV-associated nephropathy, or who is being treated for hepatitis B (HBV) infection; therapy should be offered to patients at risk of transmitting HIV to sexual partners; treatment in those with a CD4 count >500/mm^3 may be considered
- For children, use is recommended in any symptomatic patient; for asymptomatic or mildly symptomatic children ≥5 years, therapy is recommended for those with HIV RNA ≥100,000 copies/ml or CD4 <500/mm^3; for asymptomatic or mildly symptomatic children 1–4 yr, therapy is recommended for patients with HIV RNA ≥100,000 copies/ml or CD4 <25%
- For infants <12 mo, therapy is recommended regardless of clinical status, CD4 percentage, or viral load

SIDE EFFECTS

CNS: Paresthesia, headache, seizures, fever, dizziness, insomnia, asthenia, intracranial bleeding, encephalopathy

CV: QT, PR interval prolongation, deep vein thrombosis
EENT: Blurred vision, otitis media, tinnitus
GI: Diarrhea, buccal mucosa ulceration, abdominal pain, nausea, taste perversion, dry mouth, vomiting, anorexia
INTEG: Rash
MISC: Asthenia, angioedema, anaphylaxis, Stevens–Johnson syndrome, increase lipids, lipodystrophy
MS: Pain, rhabdomyolysis, myalgias

PHARMACOKINETICS

Well absorbed, 98% protein binding, hepatic metabolism, peak 2-4 hr, terminal half-life 6 hr

INTERACTIONS

Increase: Toxicity—amiodarone, astemizole, azole antifungals, benzodiazepines, buPROPion, CISapride, cloZAPine, desipramine, dihydroergotamine, encainide, ergotamine, flecainide, HMG-CoA reductase inhibitors, interleukins, meperidine, midazolam, pimozide, piroxicam, propafenone, propoxyphene, quiNIDine, ranolazine, saquinavir, terfenadine, triazolam, zolpidem
Increase: QT prolongation—class 1A/III antidysrhythmics, some phenothiazines, β-agonists, local anesthetics, tricyclics, haloperidol, chloroquine, droperidol, pentamidine, CYP3A4 inhibitors (amiodarone, clarithromycin, erythromycin, telithromycin, troleandomycin), arsenic trioxide, levomethadyl, CYP3A4 substrates (methadone, pimozide, QUEtiapine, quiNIDine, risperiDONE, ziprasidone)
Increase: Ritonavir levels—fluconazole
Increase: Level of both products—clarithromycin, ddI
Increase: Levels of bosentan
Decrease: Ritonavir levels—rifamycins, nevirapine, barbiturates, phenytoin
Decrease: Levels of anticoagulants, atovaquone, divalproex, ethinyl estradiol, lamoTRIgine, phenytoin, sulfamethoxazole, theophylline, voriconazole, zidovudine

Drug/Lab Test
Increase: AST, ALT, CPK, cholesterol, GGT, triglycerides, uric acid
Decrease: Hct, Hgb, RBC, neutrophils, WBC

Drug/Herb
Decrease: Ritonavir levels—St. John's wort; avoid concurrent use
Avoid use with red yeast rice, evening primrose oil

NURSING CONSIDERATIONS

Assess:
• HIV: viral load, CD4 at baseline, throughout therapy; blood glucose, plasma HIV RNA, serum cholesterol/lipid profile; resistance testing before starting therapy and after treatment failure
• Signs of infection, anemia
• Hepatic studies: ALT, AST
• Bowel pattern before, during treatment; if severe abdominal pain with bleeding occurs, discontinue product; monitor hydration
• Skin eruptions; rash
⚠ Rhabdomyolysis: Muscle pain, increased CPK, weakness, swelling of affected muscles; if these occur and if confirmed by CPK, product should be discontinued
⚠ QT prolongation: ECG for QT prolongation, ejection fraction; assess for chest pain, palpitations, dyspnea
⚠ Serious skin disorders: Stevens–Johnson syndrome, angioedema, anaphylaxis

Evaluate:
• Therapeutic response: improvement in HIV symptoms; improving viral load, CD4+ T cells

Teach patient/family:
• To take as prescribed; if dose is missed, to take as soon as remembered up to 1 hr before next dose; not to double dose
• That product is not a cure for HIV; that opportunistic infections can continue to be acquired
• That redistribution of body fat or accumulation of body fat may occur

- That others can continue to contract HIV from patient
- To avoid OTC, prescription medications, herbs, supplements unless approved by prescriber; not to use St. John's wort because it decreases product's effect
- That regular follow-up exams and blood work will be required

loratadine (OTC, Rx)

(lor-a'ti-deen)

Alavert, Claritin, Claritin Children's, Claritin RediTabs, Clear-Atadine, Dimetapp, Equaline Non-Drowsy, Equate Allergy Relief, Good Sense Non-Drowsy, Leader Allergy Relief, Tavist ND, Wal-itin Aller-Melts, Wal-vert

Func. class.: Antihistamine, 2nd generation

Chem. class.: Selective histamine (H_1)-receptor antagonist

Do not confuse:
loratadine/lovastatin/LORazepam/losartan

ACTION: Binds to peripheral histamine receptors, thereby providing antihistamine action without sedation

USES: Seasonal rhinitis, chronic idiopathic urticaria for those ≥2 yr

CONTRAINDICATIONS: Hypersensitivity, acute asthma attacks, lower respiratory tract disease

Precautions: Pregnancy (B), breastfeeding, increased intraocular pressure, bronchial asthma, hepatic/renal disease

DOSAGE AND ROUTES

- **Adult and child ≥6 yr: PO** 10 mg/day
- **Child 2-5 yr: PO** 5 mg/day

Renal/hepatic dose

- **Adult: PO** CCr <30 ml/min or hepatic disease, 10 mg every other day

Available forms: Tabs 10 mg; rapid-disintegrating tabs 10 mg; orally disintegrating tabs 10 mg; syr 1 mg/ml; susp 5 mg/ml, ext rel tab 10 mg

Administer:

- **Rapid-disintegrating tabs** by placing on tongue, to be swallowed after disintegrated with/without water
- Use within 6 mo of opening pouch and immediately after opening blister pack
- On empty stomach daily

Ext Rel Tab

- Do not break, crush, or chew

SIDE EFFECTS

CNS: Sedation (more common with increased doses), headache, fatigue, restlessness

EENT: Dry mouth

PHARMACOKINETICS

Onset 1-3 hr, peak 8-10 hr, duration 24 hr, metabolized in liver to active metabolites, excreted in urine, active metabolite desloratadine half-life 20 hr

INTERACTIONS

Increase: antihistamine effects—MAOIs

Increase: CNS depressant effects—alcohol, antidepressants, other antihistamines, sedative/hypnotics

Increase: loratadine level—cimetidine, ketoconazole, macrolides (clarithromycin, erythromycin)

Drug/Lab Test

False negative: skin allergy tests (discontinue antihistamine 3 days before testing)

NURSING CONSIDERATIONS

Assess:

- **Allergy:** hives, rash, rhinitis; monitor respiratory status

Perform/provide:

- Storage in tight container at room temp

Evaluate:

- Therapeutic response: absence of running or congested nose, other allergy symptoms

Teach patient/family:
- To avoid driving, other hazardous activities if drowsiness occurs
- To avoid use of other CNS depressants

LORazepam (Rx)

(lor-a'ze-pam)

Ativan

Func. class.: Sedative, hypnotic; antianxiety

Chem. class.: Benzodiazepine, short acting

Controlled Substance Schedule IV

Do not confuse:
LORazepam/ALPRAZolam/clonazePAM

ACTION: Potentiates the actions of GABA, especially in the limbic system and the reticular formation

USES: Anxiety, irritability with psychiatric or organic disorders, preoperatively; insomnia; adjunct for endoscopic procedures, status epilepticus
Unlabeled uses: Antiemetic before chemotherapy, rectal use, alcohol withdrawal, seizure prophylaxis, agitation, insomnia, sedation maintenance

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, hypersensitivity to benzodiazepines, benzyl alcohol; closed-angle glaucoma, psychosis, history of drug abuse, COPD, sleep apnea
Precautions: Children <12 yr, geriatric patients, debilitated, renal/hepatic disease, addiction, suicidal ideation, abrupt discontinuation

DOSAGE AND ROUTES

Anxiety
- **Adult/adolescent: PO** 2-3 mg/day in divided doses, max 10 mg/day
- **Geriatric: PO** 1-2 mg/day in divided doses or 0.5-1 mg at bedtime

Preoperatively
- **Adult: IM** 50 mcg/kg 2 hr prior to surgery; **IV** 44 mcg/kg 15-20 min prior to surgery, max 2 mg 15-20 min prior to surgery
- **Child ≥12 yr: IV** 0.05 mg/kg

Status epilepticus
- **Neonate: IV** 0.05 mg/kg
- **Child: IV** 0.1 mg/kg up to 4 mg/dose; **RECT** (unlabeled) 0.05-0.1 mg × 2; wait 7 min before giving 2nd dose

Alcohol withdrawal (unlabeled)
- **Adult: PO** 2 mg q6hr × 4 doses then 1 mg q6hr for 8 doses

Insomnia (unlabeled)
- **Adult: PO** 2-4 mg at bedtime; only minimally effective after 2 wk continuous therapy
- **Geriatric: PO** 0.5-1 mg initially

Available forms: Tabs 0.5, 1, 2 mg; inj 2, 4 mg/ml; conc oral sol 2 mg/ml

Administer:

PO route
- With food or milk for GI symptoms; crushed if patient is unable to swallow medication whole
- Sugarless gum, hard candy, frequent sips of water for dry mouth
- Give largest dose before bedtime if giving in divided doses
- **Concentrate:** use calibrated dropper; add to food/drink; consume immediately

IM route
- Deep into large muscle mass
- Use this route when IV is not feasible

Direct IV route
- Prepare immediately before use; short stability time
- IV after diluting in equal vol sterile water, 5% dextrose, or 0.9% NaCl for inj; give through Y-tube or 3-way stopcock; give at ≤2 mg/1 min, do not give rapidly
- Do not use in neonates (benzyl alcohol)

Y-site compatibilities: Acyclovir, albumin, allopurinol, amifostine, amikacin, amoxicillin, amoxicillin/clavulanate, amphotericin B cholesteryl, amsacrine, atenolol, atracurium, bivalirudin, bleomycin, bumetanide, butorphanol, calcium chloride/gluconate, CARBOplatin,

ceFAZolin, cefepime, cefotaxime, cefoTEtan, cefOXitin, cefTAZidime, ceftizoxime, ceftobiprole, cefTRIAXone, cefuroxime, chloramphenicol, chlorproMAZINE, cimetidine, ciprofloxacin, cisatracurium, CISplatin, cladribine, clindamycin, cloNIDine, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, dexmedetomidine, diltiazem, DOBUTamine, DOCEtaxel, DOPamine, doripenem, DOXOrubicin, DOXOrubicin liposomal, droperidol, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, eptifibatide, erythromycin, esmolol, etomidate, famotidine, fenoldopam, fentaNYL, filgrastim, fluconazole, fludarabine, fosphenytoin, furosemide, ganciclovir, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, haloperidol, heparin, hydrocortisone, HYDROmorphone, hydrOXYzine, ifosfamide, inamrinone, insulin (regular), irinotecan, isoproterenol, ketorolac, labetalol, lidocaine, linezolid, magnesium sulfate, mannitol, mechlorethamine, melphalan, meropenem, metaraminol, methadone, methotrexate, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, micafungin, midazolam, milrinone, minocycline, mitoXANtrone, morphine, mycophenolate, nafcillin, nalbuphine, naloxone, nesiritide, niCARdipine, nitroglycerin, nitroprusside, norepinephrine, octreotide, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pamidronate, pancuronium, PEMEtrexed, pentamidine, PENTobarbital, PHENobarbital, piperacillin, piperacillin-tazobactam, polymyxin B, potassium chloride, propofol, ranitidine, remifentanil, tacrolimus, teniposide, theophylline, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, tobramycin, TPN, trastuzumab, trimethobenzamide, trimethoprim-sulfamethoxazole, vancomycin, vasopressin, vecuronium, verapamil, vinCRIStine, vinorelbine, voriconazole, zidovudine

SIDE EFFECTS

CNS: *Dizziness, drowsiness,* confusion, headache, anxiety, tremors, stimulation, fatigue, depression, insomnia, hallucinations, weakness, unsteadiness

CV: *Orthostatic hypotension,* ECG changes, tachycardia, hypotension; apnea, cardiac arrest (IV, rapid)

EENT: *Blurred vision,* tinnitus, mydriasis

GI: Constipation, dry mouth, nausea, vomiting, anorexia, diarrhea

INTEG: Rash, dermatitis, itching

MISC: Acidosis

PHARMACOKINETICS

Metabolized by liver; excreted by kidneys; crosses placenta, excreted in breast milk; half-life 42 hr (neonates), 10.5 hr (older child), 12 hr (adult), 91% protein bound

PO: Onset ½ hr, peak 1-6 hr, duration 12-24 hr

IM: Onset 15-30 min, peak 1-1½ hr, duration 6-8 hr

IV: Onset 5-15 min, peak unknown, duration 6-8 hr

INTERACTIONS

Increase: LORazepam effects—CNS depressants, alcohol, disulfiram

Decrease: LORazepam effects—valproic acid, oral contraceptives

Drug/Herb

Increase: CNS depression—chamomile, kava, valerian

Drug/Lab Test

Increase: AST, ALT

NURSING CONSIDERATIONS

Assess:

⚠ **Anxiety:** decrease in anxiety; mental status: mood, sensorium, affect, sleeping pattern, drowsiness, dizziness, suicidal tendencies

• Renal/hepatic/blood status if receiving high-dose therapy

• **Physical dependency, withdrawal symptoms:** headache, nausea, vomiting, muscle pain, weakness, tremors, seizures, after long-term, excessive use

Perform/provide:
- Assistance with ambulation during beginning therapy, since drowsiness, dizziness occurs
- Check to confirm that PO medication has been swallowed
- Refrigerate parenteral form

Evaluate:
- Therapeutic response: decreased anxiety, restlessness, insomnia

Teach patient/family:
- That product may be taken with food
- Not to use product for everyday stress or for >4 mo unless directed by prescriber
- Not to take more than prescribed amount; may be habit forming
- To avoid OTC preparations (cough, cold, hay fever) unless approved by prescriber
- To avoid driving, activities that require alertness, since drowsiness may occur
- To avoid alcohol, other psychotropic medications unless directed by prescriber
- Not to discontinue medication abruptly after long-term use
- To rise slowly because fainting may occur, especially among geriatric patients
- That drowsiness may worsen at beginning of treatment
- To notify prescriber if pregnancy is planned or suspected, pregnancy (D), do not breastfeed

TREATMENT OF OVERDOSE:
Lavage, VS, supportive care, flumazenil

losartan
(lo-zar'tan)

Cozaar

Func. class.: Antihypertensive

Chem. class.: Angiotensin II receptor (type AT_1) antagonist

Do not confuse:
losartan/valsartan
Cozaar/Zocor

ACTION:
Blocks the vasoconstrictor and aldosterone-secreting effects of angiotensin II; selectively blocks the binding of angiotensin II to the AT_1 receptor found in tissues

USES:
Hypertension, alone or in combination; nephropathy in type 2 diabetes; proteinuria; stroke prophylaxis for hypertensive patients with left ventricular hypertrophy

CONTRAINDICATIONS:
Hypersensitivity

Black Box Warning: Pregnancy (D) 2nd/3rd trimesters

Precautions: Pregnancy (C) 1st trimester, breastfeeding, children, geriatric patients; hypersensitivity to ACE inhibitors; hepatic disease, angioedema, renal artery stenosis, those of African American descent

DOSAGE AND ROUTES

Hypertension
- **Adult: PO** 50 mg/day alone or 25 mg/day in combination with diuretic; maintenance 25-100 mg/day
- **Child ≥6 yr: PO** 0.7 mg/kg/day, max 50 mg/day

Hypertension with left ventricular hypertrophy (benefit does not apply to those of African American descent)
- **Adult: PO** 50 mg/day; add hydrochlorothiazide 12.5 mg/day and/or increase losartan to 100 mg/day then increase hydrochlorothiazide to 25 mg/day

Nephropathy in type 2 diabetic patients/proteinuria
- **Adult: PO** 50 mg/day, may increase to 100 mg/day

Hepatic dose
- **Adult: PO** 25 mg/day as starting dose

Available forms: Tabs 25, 50, 100 mg

Administer:
- Without regard to meals

SIDE EFFECTS

CNS: *Dizziness, insomnia,* anxiety, confusion, abnormal dreams, migraine, tremor, vertigo, headache, malaise, depression
CV: Angina pectoris, 2nd-degree AV block, cerebrovascular accident, hypotension, MI, dysrhythmias
EENT: Blurred vision, burning eyes, conjunctivitis
GI: *Diarrhea, dyspepsia,* anorexia, constipation, dry mouth, flatulence, gastritis, vomiting
GU: Impotence, nocturia, urinary frequency, UTI, renal failure
HEMA: Anemia, thrombocytopenia
INTEG: Alopecia, dermatitis, dry skin, flushing, photosensitivity, rash, pruritus, sweating, angioedema
META: Gout
MS: Cramps, myalgia, pain, stiffness
RESP: *Cough, upper respiratory infection,* congestion, dyspnea, bronchitis

PHARMACOKINETICS

Peak 1-4 hr, extensively metabolized, half-life 2 hr, metabolite 6-9 hr, excreted in urine/feces, protein binding 98.7%

INTERACTIONS

Increase: lithium toxicity—lithium
Increase: antihypertensive effect—fluconazole
Increase: hyperkalemia—potassium-sparing diuretics, potassium supplements, ACE inhibitors
Decrease: antihypertensive effect—NSAIDs, PHENobarbital, rifamycin, salicylates

NURSING CONSIDERATIONS

Assess:
• B/P with position changes, pulse before and periodically during treatment; note rate, rhythm, quality
• Baselines of renal, hepatic studies before therapy begins and periodically thereafter
• Skin turgor, dryness of mucous membranes for hydration status

⚠ Angioedema: facial swelling, dyspnea, wheezing; may occur rapidly; tongue swelling (rare)
• **CHF:** jugular venous distention; edema in feet/legs, weight daily
• **Blood dyscrasias:** thrombocytopenia, anemia (rare)

Black Box Warning: Pregnancy before starting treatment; pregnancy (D) 2nd/3rd trimester

Evaluate:
• Therapeutic response: decreased B/P, slowing diabetic neuropathy

Teach patient/family:
• To avoid sunlight or to wear sunscreen if in sunlight; that photosensitivity may occur
• To comply with dosage schedule, even if feeling better; not to discontinue abruptly
• To notify prescriber of mouth sores, fever, swelling of hands or feet, irregular heartbeat, chest pain
• That excessive perspiration, dehydration, vomiting, diarrhea may lead to fall in B/P; to consult prescriber if these occur
• That product may cause dizziness, fainting, lightheadedness
• To rise slowly to sitting or standing position to minimize orthostatic hypotension

Black Box Warning: To use contraception while taking this product; pregnancy (D) 2nd/3rd trimesters

• To avoid salt substitutes, alcohol, grapefruit juice, OTC products unless approved by prescriber

loteprednol ophthalmic
See Appendix B

lovastatin (Rx)

(loh-vah-stat'in)

Altoprev, Mevacor

Func. class.: Antilipemic

Chem. class.: HMG-CoA reductase inhibitor

Do not confuse:
lovastatin/Lotensin/Leustatin
Mevacor/mivacron

ACTION: Inhibits HMG-CoA reductase enzyme, which reduces cholesterol synthesis

USES: As an adjunct for primary hypercholesterolemia (types IIa, IIb), atherosclerosis; heterozygous familial hypercholesterolemia (adolescents)

CONTRAINDICATIONS: Pregnancy (X), breastfeeding, hypersensitivity, active hepatic disease
Precautions: Children, past hepatic disease, alcoholism, severe acute infections, trauma, hypotension, uncontrolled seizure disorders, severe metabolic disorders, electrolyte imbalances, visual disorder

DOSAGE AND ROUTES

• **Adult: PO** 20 mg/day with evening meal; may increase to 20-80 mg/day in single or divided doses, max 60 mg/day; **EXT REL** 20-60 mg/day at bedtime, max 80 mg/day

Heterozygous familial hypercholesterolemia

• **Adolescent 10-17 yr: PO** 10-40 mg with evening meal

Renal dose

• **Adult: PO** CCr <30 mg/min, max 20 mg/day unless titrated

Available forms: Tabs 10, 20, 40 mg; ext rel tab (Altocor) 10, 20, 40, 60 mg

Administer:

• In evening with meal; if dose is increased, take with breakfast and evening meal

• Altroprev not equivalent to Mevacor
• Do not crush, chew ext rel tab

SIDE EFFECTS

CNS: *Dizziness, headache, tremor,* insomnia, paresthesia
EENT: *Blurred vision,* lens opacities
GI: *Flatus, nausea, constipation, diarrhea, dyspepsia, abdominal pain, heartburn,* hepatic dysfunction, vomiting, acid regurgitation, dry mouth, dysgeusia
HEMA: Thrombocytopenia, hemolytic anemia, leukopenia
INTEG: *Rash, pruritus,* photosensitivity
MS: *Muscle cramps, myalgia,* myositis, rhabdomyolysis; leg, shoulder, or localized pain

PHARMACOKINETICS

PO: Peak 2 hr; peak response 4-6 wk, ext rel peak 14 hr; metabolized in liver (metabolites); highly protein bound; excreted in urine 10%, feces 83%; crosses blood-brain barrier, placenta; excreted in breast milk; half-life 1 hr

INTERACTIONS

Increase: myalgia, myositis, rhabdomyolysis—azole antifungals, clarithromycin, clofibrate, cycloSPORINE, dalfopristin, danazol, diltiazem, erythromycin, gemfibrozil, niacin, protease inhibitors, quinupristin, telithromycin, verapamil, avoid concurrent use
Increase: bleeding—warfarin
Increase: lovastatin effects—diltiazem
Decrease: effects of lovastatin—bile acid sequestrants, exonatide, bosentan

Drug/Herb

Decrease: effect—pectin, St. John's wort
Increase: adverse reactions—red yeast rice

Drug/Food

• Possible toxicity: grapefruit juice
Increase: levels of lovastatin with food; must be taken with food
Decrease: absorption—oat bran

Drug/Lab Test

Increase: CK, LFTs

NURSING CONSIDERATIONS

Assess:

- **Diet;** obtain diet history including fat, cholesterol in diet
- Fasting cholesterol, LDL, HDL, triglycerides periodically during treatment
- Hepatic studies at initiation, 6 wk, 12 wk after initiation or change in dose, periodically thereafter; AST, ALT, LFTs may increase
- Renal function in patients with compromised renal system: BUN, creatinine, I&O ratio

Perform/provide:

- Storage in cool environment in airtight, light-resistant container

Evaluate:

- Therapeutic response: decreased triglycerides, sLDL, total cholesterol; increased HDL; slowing CAD

Teach patient/family:

- To report suspected pregnancy (pregnancy [X]); not to breastfeed
- That blood work, ophthalmic exam will be necessary during treatment
- To report blurred vision, severe GI symptoms, dizziness, headache, muscle pain, weakness
- To use sunscreen or to stay out of the sun to prevent photosensitivity
- That previously prescribed regimen will continue: low-cholesterol diet, exercise program, smoking cessation
- That product should be taken with food, not to crush, chew ext rel product

loxapine (Rx)

(lox'a-peen)

Loxapac ♣, Loxitane

Func. class.: Antipsychotic, neuroleptic

Chem. class.: Dibenzoxazepine

Do not confuse:

Loxitane/Soriatane

ACTION: Depresses cerebral cortex, hypothalamus, limbic system, which control activity and aggression; blocks neurotransmission produced by DOPamine at synapse; exhibits strong α-adrenergic, anticholinergic blocking action; mechanism for antipsychotic effects is unclear

USES: Psychotic disorders, nonpsychotic symptoms associated with dementia

Unlabeled uses: Depression, anxiety

CONTRAINDICATIONS: Hypersensitivity, blood dyscrasias, coma, brain damage, bone marrow depression, alcohol and barbiturate withdrawal states, severe CNS depression, closed-angle glaucoma

Precautions: Pregnancy (C), breastfeeding, children <16 yr, geriatric patients, seizure disorders, cardiac/renal/hepatic disease, prostatic hypertrophy, cardiac conditions

Black Box Warning: Increased mortality in elderly patients with dementia-related psychosis

DOSAGE AND ROUTES

- **Adult: PO** 10 mg bid-qid initially, may be rapidly increased depending on severity of condition, maintenance 60-100 mg/day
- **Geriatric: PO** 5-10 mg daily-bid, increase q4-7days by 5-10 mg, max 250 mg/day

Available forms: Caps 5, 10, 25, 50 mg; tabs 5, 10, 25, 50 mg; conc 25 mg/ml

Administer:

- Reduced dose to geriatric patients
- Anticholinergic agent if EPS symptoms occur

PO route

- Concentrate mixed in orange or grapefruit juice

SIDE EFFECTS

CNS: *EPS: pseudoparkinsonism, akathisia, dystonia, tardive dyskinesia, drowsiness, headache,* seizures, confusion, neuroleptic malignant syndrome

CV: *Orthostatic hypotension,* cardiac arrest, ECG changes, tachycardia
EENT: Blurred vision, glaucoma
GI: *Dry mouth, nausea, vomiting, anorexia, constipation,* diarrhea, jaundice, weight gain
GU: Urinary retention, urinary frequency, enuresis, impotence, amenorrhea, gynecomastia
HEMA: Anemia, leukopenia, leukocytosis, agranulocytosis
INTEG: *Rash,* photosensitivity, dermatitis
RESP: Laryngospasm, dyspnea, respiratory depression

PHARMACOKINETICS

Metabolized by liver, excreted in urine, crosses placenta, enters breast milk, initial half-life 5 hr, terminal half-life 19 hr
PO: Onset 20-30 min, peak 2-4 hr, duration 12 hr

INTERACTIONS

Increase: toxicity—EPINEPHrine
Increase: EPS—other antipsychotics
Increase: CNS depression—MAOIs, antidepressants, alcohol
Increase: anticholinergic effects—anticholinergics
Decrease: effects—guanadrel, guanethidine, levodopa
Drug/Herb
Increase: CNS depression—chamomile, cola tree, hops, kava, nettle, nutmeg, skullcap, valerian
Increase: EPS—betel palm, kava

NURSING CONSIDERATIONS

Assess:
• Mental status before initial administration
• Swallowing of PO product; check for hoarding, giving of product to other patients
• I&O ratio; palpate bladder if low urinary output occurs, urinary retention may be present
• Bilirubin, CBC, LFTs q mo
• Urinalysis recommended before and during prolonged therapy
• Affect, orientation, LOC, reflexes, gait, coordination, sleep-pattern disturbances
• B/P standing and lying; pulse, respirations q4hr during initial treatment; establish baseline before starting treatment; report drops of 30 mm Hg
• Dizziness, faintness, palpitations, tachycardia on rising
• **EPS** including akathisia (inability to sit still, no pattern to movements), tardive dyskinesia (bizarre movements of jaw, mouth, tongue, extremities), pseudoparkinsonism (rigidity, tremors, pill rolling, shuffling gait)
⚠ **Neuroleptic malignant syndrome:** muscle rigidity, increased CPK, altered mental status, hyperthermia
• Constipation, urinary retention daily; if these occur, increase bulk, water in diet
Perform/provide:
• Supervised ambulation until stabilized on medication; do not involve patient in strenuous exercise program because fainting is possible; patient should not stand still for long periods
• Increased fluids to prevent constipation
• Sips of water, candy, gum for dry mouth
• Storage in airtight, light-resistant container
Evaluate:
• Therapeutic response: decrease in emotional excitement, hallucinations, delusions, paranoia; reorganization of patterns of thought, speech
Teach patient/family:
• That orthostatic hypotension may occur; to rise from sitting or lying position gradually
• To avoid hot tubs, hot showers, tub baths because hypotension may occur; that, in hot weather, heat stroke may occur; to take extra precautions to stay cool
• To avoid abrupt withdrawal of product because EPS may result; that product should be withdrawn slowly
• To avoid OTC preparations (cough, hay fever, cold) unless approved by prescriber; that serious product interactions may occur; to avoid use with alcohol, CNS

L

depressants; that increased drowsiness may occur
- To avoid hazardous activities until stabilized on medication
- To use sunscreen during sun exposure to prevent burns
- About necessity for meticulous oral hygiene because oral candidiasis may occur
- To report impaired vision, jaundice, tremors, muscle twitching

TREATMENT OF OVERDOSE:
Lavage; provide an airway, do not use EPINEPHrine

lubiprostone (Rx)
(loo-bee-pros'tone)
Amitiza
Func. class.: Gastrointestinal agent —miscellaneous

ACTION:
Locally acting chloride channel activator; enhances a chloride-rich intestinal fluid secretion without altering other electrolytes; increases motility in the intestine, thereby increasing softening and passage of stool

USES:
Chronic idiopathic constipation, constipation-predominant irritable bowel syndrome in women >18 yr

CONTRAINDICATIONS:
Hypersensitivity, GI obstruction
Precautions: Pregnancy (C), breastfeeding, children, diarrhea, inflammatory bowel disease, abdominal pain, cholelithiasis, fecal impaction, GI/hepatic disease

DOSAGE AND ROUTES
Chronic idiopathic constipation
- **Adult: PO** 24 mcg bid with food, water

IBS with constipation (females)
- **Adult and adolescent ≥18 yr: PO** 8 mcg bid with food, water

Hepatic dose
- **Adult: PO For chronic constipation:** 16 mcg bid (Child-Pugh B); 8 mcg bid (Child-Pugh C); **for irritable bowel:** 8 mcg daily (Child-Pugh C), may be increased if tolerated

Available forms: Caps 8, 24 mcg
Administer:
- With food bid

SIDE EFFECTS
CNS: *Headache,* dizziness, depression, fatigue, insomnia
CV: Hypertension, chest pain
GI: *Nausea, abdominal pain, eructation,* abdominal distention, constipation, diarrhea, dry mouth, dyspepsia, flatulence, gastroenteritis viral, gastroesophageal reflux disease, vomiting, fecal incontinence, fecal urgency
GU: UTI
MISC: Chest pain, peripheral edema, influenza, pyrexia, viral infection
MS: Back pain, arthralgia, muscle cramps, pain in extremities
RESP: Bronchitis, cough, dyspnea, nasopharyngitis, sinusitis, upper respiratory tract infection

PHARMACOKINETICS
Peak 1.14 hr; 94% protein binding; half-life 0.9-1.4 hr; metabolism rapid, extensively in stomach, jejunum

INTERACTIONS
Decrease: effect by antidiarrheals and anticholinergics
- Do not use with sodium phosphate monobasic monohydrate, sodium phosphate dibasic anhydrous or with other laxative, purgatives when evacuating bowel prior to radiologic exam or surgery
- Possible GI obstruction: NIFEdipine ext rel tab

NURSING CONSIDERATIONS
Assess:
- **GI symptoms:** nausea, abdominal pain, diarrhea

• Need for continued treatment periodically

Perform/provide:
• Storage at room temp

Evaluate:
• Therapeutic response: decreased constipation

Teach patient/family:
• To notify prescriber of GI symptoms, diarrhea, hypersensitivity reactions

lurasidone (Rx)

(loo-ras'i-done)

Latuda

Func. class.: Atypical antipsychotic

Chem. class.: Benzoisothiazol derivative

ACTION: May modulate central dopaminergic and serotonergic activity; high affinity for dopamine-D2 receptors, serotonin 5-HT2A receptors; partial agonist at serotonin 5-HT1A receptor

USES: Schizophrenia

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, abrupt discontinuation, ambient temperature increase, breast cancer, cardiac disease, dehydration, diabetes, ketoacidosis, driving, operating machinery, dysphagia, heart failure, hematologic/hepatic/renal disease, hypotension, hypovolemia, MI, infertility, obesity, Parkinson's disease, seizures, strenuous exercise, stroke, substance abuse, suicidal ideation, syncope, tardive dyskinesia

Black Box Warning: Dementia: antipsychotics (e.g., as lurasidone) not approved for treatment of dementia-related psychosis in geriatric patients; may increase risk of death in this population

DOSAGE AND ROUTES

• **Adult: PO** 40 mg/day, range 40-160 mg/day; for those receiving CYP3A4 inhibitors (max 80 mg/day), do not use with strong CYP3A4 inducers/inhibitors

Hepatic/renal dose
• **Adult: PO** Child-Pugh class B/C; CCr ≥10 ml/min, ≤50 ml/min, max 40 mg/day

Available forms: Tabs 40, 80 mg

Administer:
• Give with meal of ≥350 calories

SIDE EFFECTS

CNS: Agitation, akathisia, anxiety, dizziness, drowsiness, fatigue, hyperthermia, insomnia, dystonic reactions; **neuroleptic malignant syndrome (rare)**, pseudoparkinsonism, restlessness, **seizures, suicidal ideation**, syncope, tardive dyskinesia, vertigo

CV: Angina, **AV block, bradycardia**, hypertension, orthostatic hypotension, **sinus tachycardia, stroke**

EENT: Blurred vision

ENDO: Diabetes mellitus, ketoacidosis, hyperglycemia, hyperprolactinemia

GI: Abdominal pain, diarrhea, dyspepsia, nausea, vomiting, gastritis, weight gain/loss

GU: Amenorrhea, breast enlargement, dysmenorrhea, impotence, dysuria, renal failure

HEMA: **Agranulocytosis, anemia, leucopenia, neutropenia**

INTEG: Pruritus, rash

MS: Back pain, dysarthria; **rhabdomyolysis (rare)**

SYST: **Angioedema**

PHARMACOKINETICS

99% protein binding; excreted 80% in feces, 9% in urine; elimination half-life 18 hr; 9-19% absorbed; peak 1-3 hr, steady state 7 days

INTERACTIONS

Increase: lurasidone effect—strong CYP3A4 inhibitors; do not use concurrently

Increase: serotonin syndrome, neuroleptic malignant syndrome—SSRIs, SNRIs
Increase: sedation—other CNS depressants, alcohol

NURSING CONSIDERATIONS

Assess:

- **Schizophrenia:** hallucinations, delusions, agitation, social withdrawal; monitor orientation, behavior, mood prior to and periodically during therapy
- **Neuroleptic malignant syndrome (rare):** fever, dyspnea, tachycardia, seizures, sweating, hypo/hypertension, muscle stiffness, pallor; report immediately
- **Blood dyscrasias:** CBC periodically; blood dyscrasias may occur
- **Serious cardiac symptoms:** AV block, stroke, bradycardia may occur
- **EPS:** restlessness, difficulty speaking, loss of balance, pill rolling, masklike face, shuffling gait, rigidity, tremors, muscle spasms; monitor before and periodically during therapy; report tardive dyskinesia immediately

Black Box Warning: Dementia: this product is not approved for geriatric patients with dementia-related psychosis

- Weight gain, hyperglycemia, metabolic changes in diabetes

Perform/provide:

- Storage at room temp, protection from moisture

Evaluate:

- Therapeutic response: decreasing hallucinations, delusions, agitation, social withdrawal

Teach patient/family:

- About reason for treatment, expected results
- That lab work will be needed regularly
- To avoid hazardous activities until response is known
- To avoid OTC products unless approved by prescriber
- To report fast heartbeat, extra beats
- To report EPS symptoms, blood dyscrasias: sore throat, fever, unusual bleeding/bruising

lymphocyte immune globulin (antithymocyte, equine) (Rx)

Atgam

Func. class.: Immune globulins—immunosuppressant

ACTION: Produces immunosuppression by inhibiting the function of lymphocytes (T)

USES: Renal organ transplants to prevent rejection, aplastic anemia
Unlabeled uses: Immunosuppressant in liver, bone marrow, heart, and other organ transplants; stem-cell transplant preparations

CONTRAINDICATIONS: Hypersensitivity to this product or equine/leporine protein; acute viral illness
Precautions: Pregnancy (C), breastfeeding, children, severe renal/hepatic disease, leukopenia, thrombocytopenia

Black Box Warning: Infection, neoplastic disease

DOSAGE AND ROUTES

Renal allograft rejection

- **Adult/child: IV** 10-15 mg/kg/day × 14 days then every other day for 14 days if needed up to 21 total

Prevent renal allograft rejection

- **Adult: IV** 15 mg/kg/day × 7-14 days then every other day × 14 days for total of 21 doses in 28 days

Aplastic anemia

- **Adult: IV** 10-20 mg/kg/day × 8-14 days then every other day for ≤21 total doses

Available forms: Inj 50 mg equine gamma globulin/ml
Administer:

- Do not infuse <4 hr; usually given over 4-8 hr
- Use 0.2-1 micron in-line filter

• Skin testing must be completed before treatment; use intradermal inj of 0.1 ml of a 1:1000 dilution (5 mcg horse IgG) in 0.9% NaCl; if wheal or rash >10 mm or both, use caution during inf
• Dilute in saline sol before inf; invert IV bag so undiluted product does not contact air inside; conc should not be >1 mg/ml; do not shake
• Keep emergency equipment nearby for severe allergic reaction

SIDE EFFECTS

Renal transplant

CNS: Fever, chills, headache, dizziness, weakness, faintness, seizures
CV: Chest pain, hypo/hypertension, tachycardia
GI: Diarrhea, nausea, vomiting, epigastric pain, GI bleeding
INTEG: Rash, pruritus, urticaria, wheal
SYST: Anaphylaxis

Aplastic anemia

CNS: Fever, chills, headache, seizures, lightheadedness, encephalitis, postviral encephalopathy
CV: Bradycardia, myocarditis, irregularity
GI: Nausea, LFTs abnormality
HEMA: Thrombocytopenia, leukopenia
MS: Backache
RESP: Dyspnea, pulmonary edema

PHARMACOKINETICS

Onset rapid, half-life 5-7 days

NURSING CONSIDERATIONS

Assess:
• **Infection:** if infection occurs, evaluation will be needed to continue therapy
• Renal studies: BUN, creatinine at least monthly during treatment, for 3 mo after treatment
• Hepatic studies: alk phos, AST, ALT, bilirubin
• CBC with differential

Evaluate:
• Therapeutic response: absence of rejection; hematologic recovery (aplastic anemia)

Teach patient/family:
• To report fever, chills, sore throat, fatigue, since serious infections may occur
• To use contraceptive measures during treatment, for 12 wk after therapy

mafenide topical

See Appendix B

MAGNESIUM SALTS

magnesium chloride (Rx)
Mag-64
magnesium citrate (OTC)
magnesium gluconate (OTC)
Mag-G, Magtrate
magnesium oxide (OTC)
Mag-Ox 400, Uro-Mag
magnesium hydroxide (OTC)
Freelax, MOM, Phillips' Milk of Magnesia
magnesium sulfate (OTC, Rx)
epsom salts; magnesium sulfate (IV)—HIGH ALERT
Func. class.: Electrolyte; anticonvulsant; saline laxative, antacid

ACTION: Increases osmotic pressure, draws fluid into colon, neutralizes HCl

USES: Constipation; bowel preparation before surgery or exam; anticonvulsant for preeclampsia, eclampsia (magnesium sulfate); electrolyte
Unlabeled uses: *Magnesium sulfate:* persistent pulmonary hypertension of the

newborn (PPHN), cardiac arrest, CPR, digitoxin/digoxin toxicity, premature labor, seizure prophylaxis, status asthmaticus, torsades de pointes, ventricular fibrillation/tachycardia

CONTRAINDICATIONS: Hypersensitivity, abdominal pain, nausea/vomiting, obstruction, acute surgical abdomen, rectal bleeding, heart block, myocardial damage

Precautions: Pregnancy (A); (B) (magnesium sulfate), renal/cardiac disease

DOSAGE AND ROUTES

Laxative

- **Adult: PO** (Milk of Magnesia) 15-60 ml at bedtime
- **Adult and child >12 yr: PO** (magnesium sulfate) 15 g in 8 oz water; **PO** (Concentrated Milk of Magnesia) 5-30 ml; **PO** (magnesium citrate) 5-10 oz at bedtime
- **Child 2-6 yr: PO** (Milk of Magnesia) 5-15 ml/day

Prevention of magnesium deficiency

- **Adult and child ≥10 yr: PO** (male) 350-400 mg/day; (female) 280-300 mg/day; (breastfeeding) 335-350 mg/day; (pregnancy) 320 mg/day
- **Child 8-10 yr: PO** 170 mg/day
- **Child 4-7 yr: PO** 120 mg/day

Magnesium sulfate deficiency

- **Adult: PO** 200-400 mg in divided doses tid-qid; **IM** 1 g q6hr × 4 doses; **IV** 5 g (severe)
- **Child 6-12 yr: PO** 3-6 mg/kg/day in divided doses tid-qid

Pre-eclampsia/eclampsia (magnesium sulfate)

- **Adult: IM/IV** 4-5 g IV inf; with 5 g **IM** in each gluteus, then 5 g q4hr or 4 g **IV INF**, then 1-2 g/hr **CONT INF**, max 40 g/day or 20 g/48 hr in severe renal disease

Persistent pulmonary hypertension of the newborn (PPHN) in mechanically ventilated neonates (unlabeled)

- **Premature infants >33 wk and term neonates: IV** (magnesium sulfate) 200 mg/kg over 20-30 min then **CONT IV INF** 20-150 mg/kg/hr to maintain blood magnesium levels at 3.5-5.5 mmol/L

Status asthmaticus (unlabeled)

- **Adult: IV** (magnesium sulfate) 2 g
- **Child: IV INF** (PALS) (magnesium sulfate) 25-50 mg/kg diluted in D_5W, given over 10-20 min, max 2 g/dose

Premature labor (unlabeled)

- **Adult: IV INF** (magnesium sulfate) 4-6 g given as a loading dose over 20-30 min then 2-4 g/hr **CONT INF**; use infusion pump until contractions cease; continue inf at lowest dose over 12-24 hr; **PO** (magnesium chloride/gluconate/oxide) 648-1200 mg/day elemental magnesium in divided doses

Torsades de pointes/cardiac dysrhythmias with hypomagnesemia (unlabeled)

- **Adult: IV** (magnesium sulfate) use ACLS guidelines or 1-2 g in 50-100 ml D_5W given over 5-20 min in emergent cases or over 5-60 min

Available forms: Chloride: sus rel tabs 535 mg (64 mg Mg); enteric tabs 833 mg (100 mg Mg); **citrate:** oral sol 240-, 296-, 300-ml bottles (77 mEq/100 ml); **oxide:** tabs 400 mg; caps 140 mg; **hydroxide:** liq 400 mg/5 ml; conc liq 800 mg/5 ml; chew tabs 300, 600 mg; **sulfate:** powder for oral, bulk packages; epsom salts, bulk packages; inj 10%, 12.5%, 25%, 50%

Administer:

PO route

- With 8 oz water
- Refrigerate magnesium citrate before giving
- Shake susp before using as antacid at least 2 hr after meals
- Tablets should be chewed thoroughly before patient swallows; give 4 oz of water afterwards
- **Laxative:** give on empty stomach

IM route (magnesium sulfate)

- Give deeply in gluteal site

IV route (magnesium sulfate)

- Only when calcium gluconate available for magnesium toxicity

Direct IV route
- Dilute 50% sol to ≤20%, give at ≤150 mg/min

Continuous IV INF route
- May dilute to 20% sol, infuse over 3 hr
- IV at less than 125 mg/kg/hr; circulatory collapse may occur; use inf pump

Y-site compatibilities: Acyclovir, aldesleukin, amifostine, amikacin, ampicillin, aztreonam, ceFAZolin, cefoperazone, cefotaxime, cefOXitin, cephalothin, cephapirin, chloramphenicol, cisatracurium, DOBUTamine, doxycycline, DOXOrubicin liposome, enalaprilat, erythromycin, esmolol, famotidine, fludarabine, gallium, gentamicin, granisetron, heparin, HYDROmorphone, IDArubicin, insulin, kanamycin, labetalol, meperidine, metroNIDAZOLE, minocycline, morphine, moxalactam, nafcillin, ondansetron, oxacillin, PACLitaxel, penicillin G potassium, piperacillin, piperacillin/tazobactam, potassium chloride, propofol, remifentanil, sargramostim, thiotepa, ticarcillin, tobramycin, trimethoprim-sulfamethoxazole, vancomycin, vit B complex/C

SIDE EFFECTS

CNS: Muscle weakness, flushing, sweating, confusion, sedation, depressed reflexes, flaccid paralysis, hypothermia
CV: Hypotension, heart block, circulatory collapse, vasodilation
GI: *Nausea, vomiting, anorexia, cramps,* diarrhea
HEMA: Prolonged bleeding time
META: Electrolyte, fluid imbalances
RESP: Respiratory depression/paralysis

PHARMACOKINETICS

PO: Onset 1-2 hr
IM: Onset 1 hr, duration 4 hr
IV: Duration ½ hr
Excreted by kidney, effective anticonvulsant serum levels 2.5-7.5 mEq/L

INTERACTIONS

Increase: effect of neuromuscular blockers
Increase: hypotension—antihypertensives
Decrease: absorption of tetracyclines, fluoroquinolones, nitrofurantoin
Decrease: effect of digoxin

NURSING CONSIDERATIONS

Assess:
- **Laxative:** cause of constipation; lack of fluids, bulk, exercise; cramping, rectal bleeding, nausea, vomiting; product should be discontinued

Eclampsia: seizure precautions, B/P, ECG (magnesium sulfate); **magnesium toxicity:** thirst, confusion, decrease in reflexes; I&O ratio; check for decrease in urinary output

Evaluate:
- Therapeutic response: decreased constipation; absence of seizures (eclampsia), normal serum calcium levels

Teach patient/family:
- Not to use laxatives for long-term therapy because bowel tone will be lost
- That chilling improves taste of magnesium citrate
- To shake suspension well
- Not to give at bedtime as a laxative; may interfere with sleep; MOM is usually given at bedtime
- To give citrus fruit after administering to counteract unpleasant taste
- About reason for product, expected results

M

mannitol (Rx)

(man'i-tole)
Osmitrol, Resectisol
Func. class.: Diuretic, osmotic
Chem. class.: Hexahydric alcohol

ACTION: Acts by increasing osmolarity of glomerular filtrate, which inhibits reabsorption of water and electrolytes and increases urinary output

USES: Edema; promotion of systemic diuresis in cerebral edema; decrease in intraocular/intracranial pressure; im-

proved renal function in acute renal failure, chemical poisoning

CONTRAINDICATIONS: Active intracranial bleeding, hypersensitivity, anuria, severe pulmonary congestion, edema, severe dehydration, progressive heart, renal failure

Precautions: Pregnancy (C), breastfeeding, geriatric patients, dehydration, severe renal disease, CHF, electrolyte imbalances

Black Box Warning: Acute bronchospasm asthma

DOSAGE AND ROUTES

Oliguria, prevention

- **Adult: IV** after initial test dose; if urine output is 30-50 ml/hr × 2 hr, give 20-100 g over a 24-hr period of 15% or 20% sol

Oliguria, treatment

- **Adult: IV** after initial test dose; give balance of 50 g of a 20% sol over 1 hr then 5% via **CONT IV INF** to maintain output at 50 ml/hr
- **Child (unlabeled): IV** 0.5-2 g/kg as 15%-20% sol, run over 30-60 min; maintenance 0.25-0.5 g/kg q4-6hr

Intraocular pressure

- **Adult: IV** 1.5-2 g/kg of 15%-25% sol over 30-60 min

ICP

- **Adult: IV** 1-2 g/kg then 0.25-1 g/kg q4hr

Diuresis with drug intoxication

- **Adult and child >12 yr:** 5%-10% sol continuously up to 200 g **IV** while maintaining 100-500 ml urine output/hr

Available forms: Inj 5%, 10%, 15%, 20%, 25%; GU irrigation: 5%

Administer:

Intermittent/continuous IV route

- Change IV q24hr
- In 15%-25% sol with filter; rapid inf may worsen CHF; warm in hot water, shake to dissolve if crystals are present, use in-line filter, do not give as direct injection
- **Test dose** with severe oliguria, 0.2 g/kg over 3-5 min; if continued oliguria, give 2nd test dose; if no response, reassess patient

Y-site compatibilities: Acyclovir, aldesleukin, alemtuzumab, amifostine, amikacin, ampicillin, atropine, aztreonam, bivalirudin, bumetanide, calcium gluconate, caspofungin, ceFAZolin, cefotaxime, cefOXitin, cefTAZidime, ceftizoxime, chloramphenicol, cimetidine, cisatracurium, clindamycin, DAPTOmycin, dexmedetomidine, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, DOXOrubicin liposome, doxycycline, enalaprilat, EPINEPHrine, ertapenem, esmolol, famotidine, fenoldopam, fentaNYL, fluconazole, fludarabine, gentamicin, granisetron, heparin, HYDROmorphone, hydrOXYzine, IDArubicin, imipenem/cilastatin, insulin, isoproterenol, ketorolac, labetalol, levofloxacin, lidocaine, linezolid, LORazepam, meperidine, metoclopramide, metoprolol, metroNIDAZOLE, micafungin, midazolam, milrinone, morphine, nafcillin, niCARdipine, nitroglycerin, nitroprusside, norepinephrine, ondansetron, oxaliplatin, PACLitaxel, palonosetron, pantoprazole, penicillin G potassium, phenylephrine, piperacillin/tazobactam, potassium chloride, procainamide, prochlorperazine, promethazine, propofol, propranolol, protamine, quinupristin/dalfopristin, ranitidine, remifentanil, sargramostim, sodium bicarbonate, tacrolimus, thiotepa, ticarcillin/clavulanate, tirofiban, tobramycin, trimethoprim/sulfamethoxazole, vancomycin, vasopressin, verapamil, vit B complex with C, voriconazole

SIDE EFFECTS

CNS: Dizziness, headache, seizures, rebound increased ICP, confusion

CV: Edema, thrombophlebitis, hypo/hypertension, tachycardia, angina-like chest pains, fever, chills, CHF, circulatory overload

EENT: Loss of hearing, blurred vision, nasal congestion, decreased intraocular pressure

ELECT: Fluid, electrolyte imbalances, *acidosis*, electrolyte loss, dehydration, hypo/hyperkalemia

GI: *Nausea, vomiting,* dry mouth, diarrhea
GU: Marked diuresis, urinary retention, thirst
RESP: Pulmonary congestion

PHARMACOKINETICS

IV: Onset 1-3 hr for diuresis, 1/2-1 hr for intraocular pressure, 15 min for cerebrospinal fluid; duration 4-6 hr for intraocular pressure, 3-8 hr for cerebrospinal fluid; excreted in urine; half-life 100 min

INTERACTIONS

Increase: elimination of mannitol—lithium
Increase: excretion of salicylates, barbiturates, imipramine, bromides
Increase: hypokalemia—arsenic trioxide, cardiac glycosides, levomethadyl
Drug/Lab Test
Interference: inorganic phosphorus, ethylene glycol

NURSING CONSIDERATIONS

Assess:
- Weight, I&O daily to determine fluid loss; effect of product may be decreased if used daily; output every hr prn
- B/P lying, standing; postural hypotension may occur
- Electrolytes: potassium, sodium, chloride; include BUN, CBC, serum creatinine, blood pH, ABGs, CVP, PAP
- **Metabolic acidosis:** drowsiness, restlessness
- **Hypokalemia:** postural hypotension, malaise, fatigue, tachycardia, leg cramps, weakness, or hyperkalemia
- Rashes, temp daily
- Confusion, especially in geriatric patients; take safety precautions if needed
- Hydration including skin turgor, thirst, dry mucous membranes, provide adequate fluids
- Blurred vision, pain in eyes before, during treatment **(increased intraocular pressure)**; neurologic checks, intracranial pressure during treatment **(increased intracranial pressure)**

Evaluate:
- Therapeutic response: improvement in edema of feet, legs, sacral area daily if medication being used with CHF; decreased intraocular pressure, prevention of hypokalemia, increased excretion of toxic substances; decreased ICP

Teach patient/family:
- To rise slowly from lying or sitting position
- About the reason for, method of treatment
- To report signs of electrolyte imbalance, confusion

TREATMENT OF OVERDOSE:

Discontinue inf; correct fluid, electrolyte imbalances; hemodialysis; monitor hydration, CV status, renal function

maraviroc (Rx)

(mah-rav'er-rock)
Selzentry
Func. class.: Antiretroviral
Chem. class.: Fusion inhibitor, CCR5-receptor antagonist

M

ACTION:

Interferes with entry into HIV-1 by inhibiting the fusion of the virus and the cell membrane

USES:

CCR5-tropic HIV in combination with other antiretroviral agents for treating experienced patients

CONTRAINDICATIONS:

Hypersensitivity, dialysis, renal impairment
Precautions: Pregnancy (B), Asian patients, breastfeeding, renal/hepatic/cardiac disease, electrolyte imbalance, dehydration, immune reconstitution syndrome, infection, MI, orthostatic hypotension, children, geriatric patients, Graves' disease, Guillain-Barré syndrome, polymyositis

Black Box Warning: Hepatitis, fever, serious rash

DOSAGE AND ROUTES

Those not taking any CYP3A inducers/inhibitors

- **Adult/adolescent ≥16 yr: PO** 300 mg bid

Those taking CYP3A4 inhibitors with/without a CYP3A inducer

- **Adult/adolescent ≥16 yr: PO** 150 mg bid

Those taking CYP3A4 inducers without a strong CYP3A inhibitor

- **Adult/adolescent ≥16 yr: PO** 600 mg bid

Renal dose

- **Adult: PO** ≤30 ml/min, reduce dose to 150 mg bid

Available forms: Tabs 150, 300 mg

Administer:

- May give without regard to meals, with 8 oz water; swallow whole, do not crush, chew, break

SIDE EFFECTS

CV: MI, cardiac ischemia, orthostatic hypotension

CNS: Dizziness, depression, viral meningitis, disturbances in consciousness, peripheral neuropathy, paresthesia, dysesthesia, fever

EENT: Gingival hyperplasia

GI: Diarrhea, constipation, dyspepsia, pseudomembranous colitis, hepatotoxicity

INTEG: Rash, urticaria, pruritus, folliculitis

MS: Joint pain, leg pain, muscle cramps

RESP: Cough, upper respiratory tract infection, sinusitis, bronchitis, pneumonia, bronchospasm, obstruction

SYST: Herpes virus

PHARMACOKINETICS

Metabolized by P450 system; CYP3A metabolism; excreted 20% urine, 76% feces; protein binding 76%; terminal half-life 14-18 hr

INTERACTIONS

Increase: maraviroc levels—CYP3A inhibitors (amiodarone, aprepitant, chloramphenicol, clarithromycin, conivaptan, cycloSPORINE, dalfopristin, danazol, diltiazem, erythromycin, estradiol, fluconazole, fluvoxaMINE, imatinib, isoniazid, itraconazole, ketoconazole, miconazole, nefazodone, niCARdipine, propoxyphene, RU-486, tamoxifen, telithromycin, troleandomycin, verapamil, voriconazole, zafirlukast); reduce dose

Decrease: maraviroc levels—CYP3A4 inducers (efavirenz, aminoglutethimide, barbiturates, bexaroten, bosentan, carBAMazepine, dexamethasone, griseofulvin, modafinil, nafcillin, OXcarbazepine, phenytoin, fosphenytoin, rifabutin, rifampin, rifapentine, topiramate, tipranavir); increase dose

Drug/Herb

- Decreased maraviroc effect: St. John's wort

Drug/Food

- High-fat meal decreases absorption 33%

NURSING CONSIDERATIONS

Assess:

- **HIV:** CD_4, T-cell count, plasma HIV RNA, CCR5-tropic HIV-1; assess for changes in symptoms, other infections during treatment
- Renal studies: serum creatinine
- Bowel pattern before, during treatment
- **Allergies:** skin eruptions: rash, urticaria, itching; discontinue product

Black Box Warning: Hepatitis: dark urine; abdominal pain, vomiting; yellowing of skin, eyes; hepatomegaly; discontinue product; monitor liver function tests

Perform/provide:

- Storage at room temp

Evaluate:

- Therapeutic response: improvement in CD4, viral load, T-cell count

Teach patient/family:

- To take as prescribed; if dose is missed, to take as soon as remembered up to 1 hr before next dose; not to double dose; that product does not cure condition, should not be shared with others

- That product does not cure infection, just controls symptoms and does not prevent infecting others
- ⚠ To report sore throat, fever, fatigue **(may indicate superinfection);** yellow skin/eyes, abdominal pain, vomiting **(hepatitis);** itching, SOB **(allergic reaction)**
- That product must be taken in equal intervals around the clock to maintain blood levels for duration of therapy
- To avoid all OTC products unless approved by prescriber
- To avoid driving, other hazardous activities until reaction is known; that dizziness may occur
- To make position changes slowly to prevent postural hypotension
- To notify prescriber if pregnancy is planned or suspected, not to breastfeed

mebendazole (RX)

(me-ben'da-zole)
Func. class.: Anthelmintic
Chem. Class.: Carbamate

ACTION: Inhibits glucose uptake, degeneration of cytoplasmic microtubules in the cell; interferes with absorption, secretory function

USES: Pinworms, roundworms, hookworms, whipworms, thread-worms, pork tapeworms, dwarf tapeworms, beef tapeworms, hydatid cyst

CONTRAINDICATIONS: Hypersensitivity
Precautions: Pregnancy (C) (1st trimester), breastfeeding, children <2yr, Crohn's disease, hepatic disease, inflammatory bowel disease, ulcerative colitis

DOSAGE AND ROUTES

- **Adult and child >2 yr: PO** 100 mg as a single dose (pinworms) or bid ×3 days (whipworms, roundworms, or hookworms); course may be repeated in 3 wk if needed, max 200 mg/day

Available forms: Chew tabs 100 mg
Administer:
- May be crushed, chewed, swallowed whole, mixed with food
- PO after meals to avoid GI symptoms
- Second course after 3 wk if needed; usually recommended

SIDE EFFECTS

CNS: Dizziness, fever, headache, seizures (rare)
GI: Transient diarrhea, abdominal pain, nausea, vomiting, constipation, hepatitis
INTEG: Rash

PHARMACOKINETICS

PO Peak ½-7 hr; excreted in feces primarily (metabolites), small amount in urine (unchanged); highly bound to plasma proteins 95%

INTERACTIONS

Decrease: mebendazole effect—carBAMazepine, hydantoins
Drug/Food
Increase: absorption—high-fat meal

NURSING CONSIDERATIONS

Assess:
- Stools during entire treatment; specimens must be sent to lab while still warm, also 1-3 wk after treatment is completed
- For allergic reaction: rash (rare)
- For diarrhea during expulsion of worms; avoid self-contamination with patient's feces
- For infection in other family members, since infection from person to person is common
- Blood studies: AST, ALT, alk phos, BUN, CBC during treatment

Perform/provide:
- Storage in tight container

Evaluate:
- Therapeutic response: expulsion of worms and 3 negative stool cultures after completion of treatment

Teach patient/family:
- Proper hygiene after BM, including hand-washing technique; tell patient to avoid putting fingers in mouth; clean fingernails
- That infected person should sleep alone; do not shake bed linen, change bed linen daily, wash in hot water, change and wash undergarments daily
- To clean toilet daily with disinfectant (green soap solution)
- The need for compliance with dosage schedule, duration of treatment
- To wear shoes, wash all fruits and vegetables well before eating; use commercial fruit/vegetable cleaner
- That all members of the family should be treated (pinworms)
- To report jaundice, liver pain

mecasermin (Rx)

(mec-a'sir-men)

Increlex

Func. class.: Biologic response modifier; insulin-like growth factor

ACTION: Stimulates growth; IGF-1 is the principal hormonal mediator of statural growth; GH binds to its receptor in the liver and other tissues

USES: Growth failure in children with severe primary insulin-like growth factor-1 (IGF-1) deficiency (primary IGFD) or with growth hormone (GH) gene deletion who have developed neutralizing antibodies to GH
Unlabeled uses: ALS

CONTRAINDICATIONS: Hypersensitivity, benzyl alcohol, closed epiphyses, active/suspected neoplasia, IV use
Precautions: Pregnancy (C), breastfeeding, children <2 yr, diabetes mellitus, hypothyroidism, lymphoid tissue hypertrophy, increased intracranial pressure, malnutrition, scoliosis, sleep apnea

DOSAGE AND ROUTES

- **Child ≥2 yr: SUBCUT** 0.04-0.08 mg/kg (40-80 mcg/kg) bid; if well tolerated for 1 wk, may increase by 0.04 mg/kg/dose, max 0.12 mg/kg bid

Available forms: Inj 10 mg/ml
Administer:
SUBCUT route
- Give within 20 min of meal or snack, do not give if unable to eat or if vomiting
- Rotate inj site; use sterile, disposable syringe/needles; use small-volume syringe for accurate measurement; if using syringe (units), convert to mg/kg (weight [kg] × dose [mg/kg] × 1 ml/mg × 100 units/1 ml = units/injection)
- Do not double dose if a dose is missed

SIDE EFFECTS

CNS: Headache, seizures, dizziness, cardiac valvulopathy, increased intracranial pressure
CV: Cardiac murmur
EENT: Ear pain, otitis media, abnormal tympanometry, papilledema, visual impairment, tonsillar hypertrophy
ENDO: Hypoglycemia, ketosis, hypothyroidism, hypercholesterolemia, hypertriglyceridemia
INTEG: Pruritus, urticaria, anaphylaxis, angioedema
GI: Vomiting, nausea
HEMA: Thymus hypertrophy
MISC: Bruising, lipohypertrophy, inj site reaction
MS: Arthralgia, joint pain, slipped upper femoral epiphysis
RESP: Snoring, apnea
SYST: Antibodies to growth hormone, secondary malignancy

PHARMACOKINETICS

Bioavailability almost 100%, metabolized in liver/kidney, half-life 5.8 hr

INTERACTIONS

Increase: hypoglycemia—antidiabetics, corticosteroids
Decrease: growth suppression possible—psychostimulants

NURSING CONSIDERATIONS

Assess:
- Monitor preprandial glucose at beginning of treatment and until well tolerated
- By funduscopic exam at beginning and periodically during treatment
- **Allergic reactions:** if present, interrupt treatment and notify prescriber
- Growth rate of child at intervals during treatment
- **Serious skin disorders:** angioedema, anaphylaxis

Perform/provide:
- Storage in refrigerator before opening, avoid freezing; after opening, stable for 30 days after initial vial entry, store in refrigerator; do not use if particulate matter is present, avoid direct light, do not use after expiration date

Evaluate:
- Therapeutic response: growth in children

Teach patient/family:
- That treatment may continue for years; that regular assessments are required
- To avoid hazardous activities, driving within 2-3 hr of dosing
- About correct administration, needle disposal

meclizine (OTC, Rx)

(mek'li-zeen)

Antivert, Bonamine ✤, Bonine, Dramamine Less Drowsy Formula, Medivert, Travel Sickness, Wal-Dram II

Func. class.: Antiemetic, antihistamine, anticholinergic

Chem. class.: H_1-receptor antagonist, piperazine derivative

ACTION: Acts centrally by blocking chemoreceptor trigger zone, which in turn acts on vomiting center

USES: Vertigo, motion sickness

CONTRAINDICATIONS:

Hypersensitivity to cyclizines

Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, closed-angle glaucoma, prostatic hypertrophy, hepatic/renal disease

DOSAGE AND ROUTES

Vertigo
- **Adult/adolescent: PO** 25-100 mg/day in divided doses

Motion sickness
- **Adult/adolescent: PO** 25-50 mg 1 hr before traveling, repeat dose q24hr prn

Available forms: Tabs 12.5, 25, 50 mg; chew tabs 25 mg; caps 25, 30 mg

Administer:

PO route
- May give without regard to food
- **Chew tab:** give without regard to water or may be swallowed whole with water
- Lowest possible dose for geriatric patients; anticholinergic effects

SIDE EFFECTS

CNS: *Drowsiness,* fatigue, restlessness, headache, insomnia
CV: Hypotension
EENT: Dry mouth, blurred vision
GI: Nausea, anorexia, constipation, increased appetite
GU: Urinary retention
SYST: Anaphylaxis

PHARMACOKINETICS

PO: Onset 1 hr, duration 8-24 hr, half-life 6 hr

INTERACTIONS

Increase: sedation—CYP2D6, inhibitors
Increase: anticholinergic effects—other antihistamines, atropine, antidepressants, phenothiazines
Increase: effect of alcohol, opioids, other CNS depressants

Drug/Lab Test
False negative: allergy skin testing (allergen extracts)

M

NURSING CONSIDERATIONS

Assess:

• **Vertigo/motion sickness:** nausea, vomiting after 1 hr; assess vertigo periodically

⚠ Signs of toxicity of other products, masking of symptoms of disease: brain tumor, intestinal obstruction

• Observe for drowsiness, dizziness, level of consciousness

Evaluate:

• Therapeutic response: absence of dizziness, vomiting

Teach patient/family:

• That a false-negative result may occur with skin testing for allergies; that these procedures should not be scheduled for ≤4 days after discontinuing use

• To avoid hazardous activities, activities requiring alertness because dizziness may occur; to request assistance with ambulation

• To avoid alcohol, other depressants; not to breastfeed

medroxyPROGESTERone (Rx)

(me-drox'ee-proe-jess'te-rone)

Depo-Provera, Depo-sub Q Provera, Gen-Medroxy ♣, Provera

Func. class.: Antineoplastic, hormone, contraceptive

Chem. class.: Progesterone derivative

Do not confuse:

medroxyPROGESTERone/methylPREDNISolone

Provera/Premarin/Covera

ACTION: Inhibits secretion of pituitary gonadotropins, which prevents follicular maturation and ovulation; antineoplastic action against endometrial cancer

USES: Uterine bleeding (abnormal); secondary amenorrhea; prevention of endometrial changes associated with estrogen replacement therapy (ERT); contraceptive; inoperable, recurrent, metastatic endometrial/ renal cancer

Unlabeled uses: Hot flashes; symptoms of menopause; paraphilia (men); hot flashes (men) with prostate cancer

CONTRAINDICATIONS: Pregnancy (X), hypersensitivity, reproductive cancer, genital bleeding (abnormal, undiagnosed), missed abortion, stroke, cerebrovascular disease, cervical cancer, hepatic disease, uterine/vaginal cancer

Black Box Warning: Breast cancer, MI, stroke, thromboembolic disease, thrombophlebitis

Precautions: Breastfeeding, hypertension, asthma, blood dyscrasias, gallbladder disease, CHF, diabetes mellitus, bone disease, depression, migraine headache, seizure disorders, renal/hepatic disease, family history of cancer of breast or reproductive tract, bone mineral density loss, ocular disorders, AIDS/HIV, alcoholism, children, hyperlipidemia

Black Box Warning: Cardiac disease, dementia, osteoporosis

DOSAGE AND ROUTES

Secondary amenorrhea

• **Adult: PO** 5-10 mg/day × 5-10 days

Uterine bleeding

• **Adult: PO** 5-10 mg/day × 5-10 days starting on 16th or 21st day of menstrual cycle

With ERT

• **Adult: PO** 5-10 mg daily × 10-14 or more days/mo (sequential estrogen); 2.5-5 mg daily (continuous estrogen)

Contraceptive

• **Adult: IM** (contraceptive inj) 150 mg q12wk; **SUBCUT** (depot SUBCUT Provera 104 inj) 104 mg q3mo

Endometrial/renal cancer

• **Adult: IM** 400 mg-1 g (using 400 mg/ml depot inj susp) weekly

Hot flashes/symptoms of menopause (unlabeled)

• **Adult (female): PO** 20 mg/day; **IM** 150 mg monthly

Hot flashes (men) in prostate cancer (unlabeled)
• **Adult (male): IM** Depot 150 or 400 mg
Available forms: Tabs 2.5, 5, 10 mg; inj susp, 150, 400 mg/ml; depot-SUBCUT inj: 104 mg/0.65 ml
Administer:
PO route
• Give without regard to food
IM route
• Visually inspect particulate matter and discoloration before use
Depo-Provera contraceptive injection suspension
• IM only, *never* IV
• Instruct patient on risks and warnings associated with hormonal contraceptives (see Patient Information)
• The possibility of pregnancy should be excluded before giving the first dose of medroxyprogesterone or whenever more than 14 wk has passed since the last dose
• Do not dilute
• Shake vigorously immediately before administration
• Inject deeply into the gluteal or deltoid muscle; Aspirate before injection to avoid injection into a blood vessel
Depo-Provera sterile aqueous suspension, preserved
• IM only, *never* IV
• Instruct patient on risks and warnings associated with progestin use (see Patient Information)
• Shake vigorously immediately before use
• When multidose vials are used, take special care to prevent contamination
• Inject deeply into the gluteal or deltoid muscle; aspirate before injection
SUBCUT route
Depo-subQ provera 104 contraceptive injection suspension *only*
• For subcut only, *never* give IM or IV
• Instruct patient on risks and warnings associated with hormonal contraceptives (see Patient Information)
• Shake vigorously for at least 1 min before use
• Inject the entire contents of the prefilled syringe subcut into the anterior thigh or abdomen, avoiding bony areas and the umbilicus; gently grasp and squeeze a large area of skin in the chosen injection area, ensuring that the skin is pulled away from the body; insert the needle at a 45-degree angle; inject until the syringe is empty; this usually requires 5-7 sec; following use, press lightly on the injection site with a clean cotton pad for a few seconds; do not rub the area

SIDE EFFECTS

CNS: Dizziness, headache, migraines, depression, fatigue, nervousness
CV: Hypotension, thrombophlebitis, edema, **thromboembolism, stroke, PE, MI**
EENT: Diplopia
GI: *Nausea,* vomiting, anorexia, cramps, increased weight, **cholestatic jaundice,** abdominal pain
GU: Amenorrhea, cervical erosion, breakthrough bleeding, dysmenorrhea, vaginal candidiasis, breast changes, *gynecomastia, testicular atrophy, impotence,* endometriosis, **spontaneous abortion,** vaginitis, libido increased/decreased
INTEG: Rash, urticaria, acne, hirsutism, alopecia, oily skin, seborrhea, purpura, melasma, photosensitivity, injection site reaction
META: Hyperglycemia
MS: Decreased bone density
SYST: **Angioedema, anaphylaxis**

PHARMACOKINETICS

PO: Duration 24 hr; excreted in urine and feces; metabolized in liver

INTERACTIONS

Decrease: medroxyPROGESTERone action—aminoglutethimide, carBAMazepine, phenytoins, PHENobarbital, rifampin
Decrease: bone mineral density—anticoagulants, corticosteroids
Drug/Lab Test
Increase: LFTs, HDL, triglycerides
Decrease: GTT, HDL

NURSING CONSIDERATIONS

Assess:

- Pelvic exam, Pap smear before treatment, periodically
- ⚠ **Severe allergic reaction, angioedema;** have EPINEPHrine and rescusitative equipment available
- Weight daily; notify prescriber of weekly weight gain >5 lb; bone mineral density
- B/P at beginning of treatment and periodically
- I&O ratio; be alert for decreasing urinary output, increasing edema
- Hepatic studies: ALT, AST, bilirubin periodically during long-term therapy
- Edema, hypertension, cardiac symptoms, jaundice
- Mental status: affect, mood, behavioral changes, depression

Black Box Warning: This product should not be given to those with breast cancer, MI, stroke, thromboembolic disorders

- **Bone mineral density loss:** in those taking anticoagulants, corticosteroids with Depo-Provera or Depo-sub Q Provera

Black Box Warning: Use of product shown to increase dementia in women ≥65 yr old; use may increase osteoporosis in long-term treatment; those who smoke also at greater risk; adequate calcium and vit D should be taken

Perform/provide:

- Storage in dark area

Evaluate:

- Therapeutic response: decreased abnormal uterine bleeding, absence of amenorrhea

Teach patient/family:

- To avoid sunlight or to use sunscreen; photosensitivity can occur
- ⚠ To report breast lumps, vaginal bleeding, edema, jaundice, dark urine, clay-colored stools, dyspnea, headache, blurred vision, abdominal pain, sudden change in speech/coordination, numbness or stiffness in legs, chest pain; males to report impotence, gynecomastia
- To report suspected pregnancy (X); fertility returns 6-12 mo after discontinuing

Black Box Warning: Long-term use decreases bone density; exercise, calcium supplements can help lessen osteoporosis

medrysone ophthalmic

See Appendix B

megestrol (Rx)

(me-jess'trole)

Megace, Megace ES

Func. class.: Antineoplastic hormone

Chem. class.: Progestin

Do not confuse:
Megace/Reglan

ACTION: Affects endometrium with antiluteinizing effect; thought to bring about cell death

USES: Breast, endometrial cancer; cachexia, anorexia, weight loss with AIDS
Unlabeled uses: Hot flashes in women (menopause) or men (prostate cancer), unexplained weight loss in geriatric patients, endometriosis, renal cell cancer (palliative), endometrial cancer, breast cancer (metastatic)

CONTRAINDICATIONS: Pregnancy (D) tabs, (X) susp; hypersensitivity
Precautions: Diabetes, thrombosis, adrenal insufficiency

DOSAGE AND ROUTES

Endometrial/ovarian carcinoma

- **Adult: PO** 40-320 mg/day in divided doses

Breast carcinoma

- **Adult: PO** 40 mg qid or 160 mg/day

Cachexia (AIDS)

- **Adult: PO** 800 mg/day (oral susp) or 625 mg/day (ES)

Hot flashes (unlabeled)

- **Adult: PO** 20 mg bid

Metastatic endometrial cancer
• **Adult: PO** 40-320 mg/day in divided doses × ≥2 mo
Available forms: Tabs 20, 40 mg; oral susp 40, 125 mg/ml
Administer:
• Oral susp for AIDS patients; shake well
• Tablets for carcinoma
• Without regard to food

SIDE EFFECTS

CNS: Mood swings, insomnia, fever, lethargy, depression
CV: Thrombophlebitis, thromboembolism, hypertension
ENDO: Adrenal insufficiency
GI: Nausea, vomiting, diarrhea, abdominal cramps, weight gain, flatus, indigestion
GU: Gynecomastia, fluid retention, hypercalcemia, vaginal bleeding, discharge, impotence, decreased libido, menstruation disorders
INTEG: Alopecia, rash, pruritus, purpura, itching, sweating
META: Hyperglycemia
MISC: Tumor flare
RESP: Dyspnea

PHARMACOKINETICS

PO: Half-life 13-105 hr; metabolized in liver; excreted in feces, urine, breast milk; food increases bioavailability of oral sol

INTERACTIONS

• Do not use with dofetilide
Decrease: megestrol effect—antidiabetics
Drug/Lab Test
Increase: glucose

NURSING CONSIDERATIONS

Assess:
• PSA levels in men (prostate cancer); blood glucose, LFTs, serum calcium, weight
• Effects of alopecia on body image; feelings about body changes
• Frequency of stools, characteristics: cramping, acidosis, signs of dehydration (rapid respirations, poor skin turgor, decreased urine output, dry skin, restlessness, weakness)
• Anorexia, nausea, vomiting, constipation, weakness, loss of muscle tone
⚠ **Thrombophlebitis:** Homans' sign, edema; pain in calf, thigh; notify prescriber immediately
Perform/provide:
• Storage in tight container at room temp
Evaluate:
• Therapeutic response: decreased tumor size, spread of malignancy; weight gain in AIDS patients; resolved dysfunctional uterine bleeding
Teach patient/family:
• To report vaginal bleeding
• That nonhormonal contraception should be used during and for 4 mo after treatment; pregnancy (D) tabs, (X) susp
• That gynecomastia, alopecia can occur; reversible after discontinuing treatment
⚠ To recognize signs of fluid retention, thromboemboli; to report these immediately
• To monitor blood glucose if diabetic

⚠ HIGH ALERT

melphalan (Rx)

(mel'fa-lan)
Alkeran
Func. class.: Antineoplastic, alkylating agent
Chem. class.: Nitrogen mustard

Do not confuse:
melphalan/Myleran

ACTION: Responsible for cross-linking DNA strands, thereby leading to cell death; activity is not cell-cycle–phase specific

USES: Multiple myeloma, malignant melanoma, advanced ovarian cancer
Unlabeled uses: Breast, testicular, prostate carcinoma; osteogenic sarcoma, amyloidosis, chronic myelogenous leukemia, non-Hodgkin's lymphoma, pediatric rhabdomyosarcoma, stem cell transplant, bone marrow ablation, AML, myelodysplastic syndrome

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, other nitrogen mustards

Black Box Warning: Hypersensitivity to this product

Precautions: Children, radiation therapy, infections, renal disease

Black Box Warning: Bone marrow depression, secondary malignancy, radiation therapy; requires an experienced clinician

DOSAGE AND ROUTES

Multiple myeloma
- **Adult: PO** 6 mg daily × 2-3 wk, adjust dose based on blood counts or 10 mg daily × 7-10 day
- **Adult: IV INF** 16 mg/m², reduce with renal insufficiency, give over 15-20 min, give at 2-wk intervals × 4 doses then at 4-wk intervals

Ovarian carcinoma
- **Adult: PO** 200 mcg/kg/day × 5 days q4-5wk

Testicular cancer/breast cancer/ non-Hodgkin's lymphoma/ osteogenic sarcoma (unlabeled)
- **Adult: PO** 150 mcg/kg/day × 7 days q4wk; when leukocytes normal, give 50 mcg/kg/day maintenance

Pediatric rhabdomyosarcoma (unlabeled)
- **Child: IV** 10-35 mg/m² q21-28days

Available forms: Tabs 2 mg, powder for inj 50 mg
Administer:
- Antiemetic 30-60 min before product to prevent vomiting

PO route
- Give on empty stomach
- Protect from light, store refrigerated

Intermittent IV INF route
- Use gloves during administration; if skin exposure occurs, wash immediately with soap and water, use cytotoxic handling procedures
- Give after reconstituting with 10 ml diluent provided (5 mg/ml); shake, dilute dose with 0.9% NaCl (≤0.45 mg/ml), give within 1 hr, run over ≥15 min; degrading of product occurs rapidly, make sure infusion is completed in time specified

Y-site compatibilities: Acyclovir, amikacin, aminophylline, ampicillin, aztreonam, bleomycin, bumetanide, buprenorphine, butorphanol, calcium gluconate, CARBOplatin, carmustine, ceFAZolin, cefepime, cefoperazone, cefotaxime, cefoTEtan, cefTAZidime, ceftizoxime, cefTRIAXone, cefuroxime, cimetidine, CISplatin, clindamycin, cyclophosphamide, cytarabine, dacarbazine, DACTINomycin, DAUNOrubicin, dexamethasone, diphenhydrAMINE, DOXOrubicin, doxycycline, droperidol, enalaprilat, etoposide, famotidine, floxuridine, fluconazole, fludarabine, fluorouracil, furosemide, gallium, ganciclovir, gentamicin, granisetron, haloperidol, heparin, hydrocortisone, hydrocortisone sodium phosphate, HYDROmorphone, hydrOXYzine, IDArubicin, ifosfamide, imipenem-cilastatin, LORazepam, mannitol, mechlorethamine, meperidine, mesna, methotrexate, methylPREDNISolone, metoclopramide, metroNIDAZOLE, miconazole, minocycline, mitoMYcin, mitoXANtrone, morphine, nalbuphine, netilmicin, ondansetron, pentostatin, piperacillin, plicamycin, potassium chloride, prochlorperazine, promethazine, ranitidine, sodium bicarbonate, streptozocin, teniposide, thiotepa, ticarcillin, ticarcillin/clavulanate, tobramycin, trimethoprim-sulfamethoxazole, vancomycin, vinBLAStine, vinCRIStine, vinorelbine, zidovudine

SIDE EFFECTS

GI: *Nausea, vomiting,* stomatitis, diarrhea, hepatitis
GU: Amenorrhea, hyperuricemia, gonadal suppression, hyperuricemia
HEMA: Thrombocytopenia, neutropenia, leukopenia, anemia
INTEG: Rash, urticaria, alopecia, pruritus
RESP: Fibrosis, dysplasia, dyspnea, pneumonitis
SYST: Anaphylaxis, allergic reactions, secondary malignancies, edema

PHARMACOKINETICS

Metabolized in liver, excreted in urine, half-life 1½ hr, protein binding 80%-90%

INTERACTIONS

• Avoid administration of sargramostim, GM-CSF, filgrastim, G-CSF 14 hr before or 24 hr after product
Increase: toxicity—antineoplastics, radiation
Increase: pulmonary toxicity—carmustine
Increase: renal failure risk—cycloSPORINE
Increase: enterocolitis risk—nalidixic acid
Increase: bleeding risk—NSAIDs, anticoagulants, salicylates, thrombolytics, platelet inhibitors
Decrease: antibody response—live virus vaccines

NURSING CONSIDERATIONS

Assess:

Black Box Warning: **Bone marrow depression:** CBC, differential, platelet count weekly; withhold product if WBC is <3000/mm³ or platelet count is <100,000/mm³; notify prescriber; recovery usually occurs in 6 wk

• Renal studies: BUN, serum uric acid before, during therapy
• I&O ratio; report fall in urine output to 30 ml/hr
• **Infection:** fever, cough, temp, chills, sore throat; notify prescriber
• Hepatic studies before, during therapy (bilirubin, AST, ALT, LDH) as needed; jaundiced skin and sclera, dark urine, clay-colored stools, itchy skin, abdominal pain, fever, diarrhea
• **Bleeding:** hematuria, guaiac, bruising or petechiae, mucosa or orifices q8hr
• Buccal cavity q8hr for dryness, sores, ulceration, white patches, oral pain, bleeding, dysphagia
• Local irritation, pain, burning, discoloration at inj site
• **Hyperuricemia:** joint pain, edema, increased uric acid, increase fluids to >2 L unless contraindicated
⚠ **Severe allergic reaction:** rash, pruritus, urticaria, purpuric skin lesions, itching, flushing; assess allergy to chlorambucil; cross-sensitivity may occur

Perform/provide:

• Increase fluid intake to 2-3 L/day to prevent urate deposits, calculi formation
• Rinsing of mouth tid-qid with water, club soda; brushing of teeth bid-tid with soft brush or cotton-tipped applicators for stomatitis; use unwaxed dental floss

Evaluate:

• Therapeutic response: decreased tumor size, spread of malignancy

Teach patient/family:

• That usually sterility, amenorrhea occur; reversible after discontinuing treatment
• To avoid foods with citric acid, hot or rough texture
• To report any bleeding, white spots, or ulcerations in mouth to prescriber; to examine mouth daily
• To report signs of infection: fever, sore throat, flulike symptoms
• To report suspected pregnancy; to use contraception during treatment; pregnancy (D)
• To report signs of anemia: fatigue, headache, faintness, SOB, irritability
• To avoid use of razors, commercial mouthwash
• To avoid use of aspirin products, NSAIDs, alcohol

M

memantine (Rx)

(me-man'teen)

Ebixa ♣, Namenda, Namenda XR

Func. class.: Anti-Alzheimer agent

Chem. class.: NMDA receptor antagonist

ACTION: Antagonist action of CNS NMDA receptors that may contribute to the symptoms of Alzheimer's disease

USES: Moderate to severe dementia in Alzheimer's disease

Unlabeled uses: Vascular dementia, acquired pendular nystagmus

CONTRAINDICATIONS: Children, hypersensitivity

Precautions: Pregnancy (B), breastfeeding, renal disease, GU conditions that raise urine pH, seizures, severe hepatic disease, renal failure

DOSAGE AND ROUTES

• **Adult: PO** 5 mg/day, may increase dose in 5-mg increments ≥1 wk intervals; recommended target dose of 20 mg/day as 10 mg bid; × R 7 mg q day increase in 7 mg increments ≥ q wk to 28 mg/day

Available forms: Tabs 5, 10 mg; tab titration pak 5, 10 mg; oral sol 2 mg/ml (10 mg/5 ml); cap ext rel 7, 14, 21, 28 mg

Administer:

• Can be taken without regard to meals

• Twice a day if dose >5 mg

• Dosage adjusted to response no more than q1wk

• **Ext rel caps:** do not crush, chew, divide; swallow whole or open and sprinkle on applesauce

• **Oral sol** using device provided; remove dosing syringe, green cap, plastic tube from plastic; attach tube to green cap; open cap by pushing down on cap, turning counterclockwise; remove unscrewed cap; carefully remove seal from bottle, discard; insert plastic tube fully into bottle, screw green cap tightly onto bottle by turning cap clockwise; keeping bottle upright on table, remove lid; with plunger fully depressed, insert tip of syringe into cap; while holding syringe, gently pull up on plunger; remove syringe; invert syringe, slowly press plunger to level that removes large air bubbles; keep plunger in inverted position; few small air bubbles may be present

SIDE EFFECTS

CNS: *Dizziness, confusion,* somnolence, headache, hallucinations, stroke

CV: Hypertension, heart failure, CHF

GI: Vomiting, constipation

HEMA: Anemia

INTEG: Rash

MISC: Back pain, fatigue, pain

RESP: Coughing, dyspnea

PHARMACOKINETICS

Rapidly absorbed PO, 44% protein binding, very little metabolism, 57%-82% excreted unchanged in urine, terminal elimination half-life 60-80 hr

INTERACTIONS

• May alter levels of both products: hydrochlorothiazide, triamterene, cimetidine, quiNIDine, ranitidine, nicotine

Increase: effect—levodopa, some ergots

Decrease: clearance of memantine—products that make urine alkaline (sodium bicarbonate, carbonic anhydrase inhibitors)

NURSING CONSIDERATIONS

Assess:

• **Alzheimer's dementia:** affect, mood, behavioral changes; hallucinations, confusion, attention, orientation, memory

Perform/provide:

• Assistance with ambulation during beginning therapy; dizziness may occur

Evaluate:

• Therapeutic response: decrease in confusion, improved mood, maintenance of function, even with no improvement in symptoms

Teach patient/family:
- To report side effects: restlessness, psychosis, visual hallucinations, stupor, LOC; may indicate overdose
- To use product exactly as prescribed; that product not a cure, to avoid alcohol, nicotine
- To use oral sol dispenser
- To avoid OTC, herbal products unless approved by prescriber

⚠ HIGH ALERT

meperidine (Rx)

(me-per'i-deen)

Demerol, Meperitab

Func. class.: Opioid analgesic

Chem. class.: Phenylpiperidine derivative

Controlled Substance Schedule II

Do not confuse:
meperidine/HYDROmorphone/meprobamate/morphine
Demerol/Dilaudid/Desyrel/Demulen

ACTION: Depresses pain impulse transmission at the spinal cord level by interacting with opioid receptors

USES: Moderate to severe pain preoperatively, postoperatively
Unlabeled uses: Obstetric/regional analgesic, acute severe headache/migraine, shaking chills induced by IV amphotericin B or postoperative shivering

CONTRAINDICATIONS: Hypersensitivity, severe respiratory insufficiency
Precautions: Pregnancy (C), breastfeeding, children <18 yr, geriatric patients, addictive personality, increased intracranial pressure, MI (acute), severe heart disease, respiratory depression, renal/hepatic disease, seizure disorder, abrupt discontinuation, chronic pain

DOSAGE AND ROUTES

Moderate to severe pain
- **Adult: PO/SUBCUT/IM** 50-150 mg q3-4hr prn; **CONT INF** 15-35 mg/hr as **PCA** 10 mg then 1- to 5-mg incremental dose; lockout interval 6-10 min
- **Child: PO/SUBCUT/IM** 1-1.8 mg/kg q3-4hr prn, max 100 mg q4hr

Labor analgesia
- **Adult: SUBCUT/IM** 50-100 mg given when contractions regularly spaced, repeat q1-3hr prn

Preoperatively
- **Adult: IM/SUBCUT** 50-100 mg 30-90 min before surgery
- **Child: IM/SUBCUT** 1-2.2 mg/kg 30-90 min before surgery, max 100 mg

Renal dose
- Avoid or modify dose

Available forms: Inj 10, 25, 50, 75, 100 mg/ml; tabs 50, 100 mg; oral sol 50 mg/5 ml

Administer:

PO route
- May give with food or milk to decrease GI irritation
- **Oral liquid:** dilute in 4 oz water

IM/SUBCUT route
- Patient should remain recumbent for 1 hr after IM/SUBCUT route
- With antiemetic for nausea, vomiting
- When pain beginning to return; determine dosage interval by patient response
- In gradually decreasing dose after long-term use; withdrawal symptoms may occur
- Inject IM into large muscle mass; IM preferred route for multiple inj

Direct IV route
- Dilute to conc of 10 mg/ml with sterile water for inj or NS
- Inject slowly ≤25 mg/min
- Have emergency equipment and opiate antagonist on hand

Continuous IV INF route
- Dilute to conc of 1 mg/ml
- Infuse using inf pump

M

Syringe compatibilities: Butorphanol, chlorproMAZINE, cimetidine, dimenhyDRINATE, diphenhydrAMINE, droperidol, fentaNYL, glycopyrrolate, hydrOXYzine, ketamine, metoclopramide, midazolam, pentazocine, perphenazine, prochlorperazine, promazine, promethazine, ranitidine, scopolamine

Y-site compatibilities: Amifostine, amikacin, atenolol, aztreonam, bumetanide, ceFAZolin, cefotaxime, cefOXitin, ceftAZidime, ceftizoxime, cefTRIAXone, cefuroxime, cephapirin, cisatracurium, cladribine, clindamycin, diltiazem, diphenhydrAMINE, DOBUTamine, DOPamine, DOXOrubicin HCL, doxycycline, droperidol, erythromycin, famotidine, filgrastim, fluconazole, fludarabine, gallium, gentamicin, granisetron, hydrocortisone, insulin (regular), kanamycin, labetalol, lidocaine, methyldopate, melphalan, metoclopramide, metoprolol, metroNIDAZOLE, moxalactam, ondansetron, oxacillin, oxytocin, PACLitaxel, penicillin G potassium, piperacillin, potassium chloride, propofol, propranolol, ranitidine, remifentanil, sargramostim, teniposide, thiotepa, ticarcillin, ticarcillin/clavulanate, tobramycin, vancomycin, verapamil, vinorelbine

Continuous intrathecal INF route

- Use controlled inf device; implantable controlled micro inf device used for highly concentrated inf, monitor for several days after implantation
- Filling of inf reservoir should only be done by those fully qualified
- To prevent pain, depletion of reservoir should be avoided

SIDE EFFECTS

CNS: *Drowsiness, dizziness, confusion, headache, sedation, euphoria,* increased intracranial pressure, seizures, serotonin syndrome

CV: Palpitations, bradycardia, hypotension, change in B/P, tachycardia (IV)

EENT: Tinnitus, blurred vision, miosis, diplopia, depressed corneal reflex

GI: Nausea, vomiting, anorexia, constipation, cramps, biliary spasm, paralytic ileus

GU: Urinary retention, dysuria

INTEG: Rash, urticaria, bruising, flushing, diaphoresis, pruritus

RESP: Respiratory depression

SYST: Anaphylaxis

PHARMACOKINETICS

Metabolized by liver (to active/inactive metabolites), excreted by kidneys; crosses placenta, excreted in breast milk; half-life 3-4 hr; toxic by-product accumulation can result from regular use or renal disease; protein binding 65%-75%

PO: Onset 15 min, peak ½-1 hr, duration 2-4 hr, absorption 50%

SUBCUT/IM: Onset 10 min, peak ½-1 hr, duration 2-4 hr, well absorbed

IV: Onset 5 min, duration 2 hr

INTERACTIONS

⚠ May cause fatal reaction: MAOIs, procarbazine

Increase: serotonin syndrome, neuroleptic malignant syndrome, SSRIs, SNRIs, serotonin-receptor agonists

Increase: effects with other CNS depressants, alcohol, opioids, sedative/hypnotics, antipsychotics, skeletal muscle relaxants

Increase: adverse reactions—protease inhibitor antiretrovirals

Decrease: meperidine effect—phenytoin

Drug/Herb

Increase: CNS depression—St. John's wort

Drug/Lab Test

Increase: amylase, lipase

NURSING CONSIDERATIONS

Assess:

- **Pain:** location, type, character; give product before pain becomes extreme; reassess after 60 min (IM, SUBCUT, PO) and 5-10 min (IV)
- Renal function prior to initiating therapy; poor renal function can lead to ac-

cumulation of toxic metabolite and seizures
• I&O ratio; check for decreasing output; may indicate urinary retention
• For constipation; increase fluids, bulk in diet; give stimulant laxatives if needed
• CNS changes: dizziness, drowsiness, hallucinations, euphoria, LOC, pupil reactions with chronic or high-dose use
• Allergic reactions: rash, urticaria
Respiratory dysfunction: depression, character, rate, rhythm; notify prescriber if respirations are <12/min
• CNS stimulation: with chronic or high doses

Perform/provide:
• Storage in light-resistant container at room temp

Evaluate:
• Therapeutic response: decrease in pain

Teach patient/family:
• To report any symptoms of CNS changes, allergic reactions
• That physical dependency may result from extended use, use should be short term only
• That drowsiness, dizziness may occur
• That withdrawal symptoms may occur: nausea, vomiting, cramps, fever, faintness, anorexia
• To make position changes slowly; orthostatic hypotension can occur
• To avoid OTC medications, alcohol unless directed by prescriber

TREATMENT OF OVERDOSE:
Naloxone (Narcan) 0.2-0.8 mg IV, caution in physically dependent patients, O_2, IV fluids, vasopressors

mercaptopurine (6-MP) (Rx)
(mer-kap-toe-pyoor'een)
Purinethol
Func. class.: Antineoplastic-antimetabolite
Chem. class.: Purine analog

ACTION:
Inhibits purine metabolism at multiple sites, which inhibits DNA and RNA synthesis; specific for S phase of cell cycle

USES:
Acute lymphocytic leukemia
Unlabeled uses: Ulcerative colitis, Crohn's disease

CONTRAINDICATIONS:
Pregnancy (D), breastfeeding, patients with prior product resistance, hypersensitivity, requires an experienced clinician, secondary malignancy, infection, hypocalcemia, hyperuricemia, hyperphosphatemia, hyperkalemia
Precautions: Renal/hepatic disease, tumor lysis syndrome, dental disease, herpes, radiation therapy, leukopenia, thrombocytopenia, anemia

DOSAGE AND ROUTES
Acute lymphocytic leukemia
• **Adult: PO** 2.5-5 mg/kg/day or 80-100 mg/m²/day, maintenance 1.5-2.5 mg/kg/day
• **Child: PO** 2.5-5 mg/kg/day, maintenance 1.5-2.5 mg/kg/day or 70-100 mg/m²/day

Crohn's disease/ulcerative colitis (unlabeled)
• **Adult: PO** 1.5-2 mg/kg/day

Available forms: Tabs 50 mg

Administer:
• Give product after evening meal, before bedtime, on an empty stomach
• Sodium bicarbonate to maintain uric acid levels, alkalinization of urine

SIDE EFFECTS

CNS: Weakness
GI: *Nausea, vomiting, anorexia, diarrhea, stomatitis,* hepatotoxicity (high doses), jaundice, gastritis, pancreatitis
GU: Renal failure, hyperuricemia, oliguria, crystalluria, hematuria
HEMA: Thrombocytopenia, leukopenia, myelosuppression, anemia
INTEG: *Rash,* dry skin, urticaria, alopecia

PHARMACOKINETICS

Incompletely absorbed when taken orally, metabolized in liver, excreted in urine, peak 1-2 hr, terminal half-life 1-1.5 hr

INTERACTIONS

Increase: effects of mercaptopurine—allopurinol, avoid use of decrease dose
Increase: effects—radiation or other antineoplastics, immunosuppressants
Increase: bone marrow depression—azaTHIOprine, sulfamethoxazole-trimethoprim, avoid concurrent use
Increase: anticoagulant action—anticoagulants, NSAIDs, thrombolytics, platelet inhibitors, salicylates
Decrease: antibodies—live virus vaccines
Decrease: TPMT, rapid bone marrow suppression—balzalazide, olsalazine, mesalamine, sulfaSALAzine, use cautiously

NURSING CONSIDERATIONS

Assess:

⚠ **Bone marrow suppression:** CBC, differential, platelet count weekly; withhold product at first sign of abnormally large decrease in blood counts, unless bone marrow aplasia is the goal

• **Thiopurine methyltransferase (TPMT) deficiency:** individuals are prone to rapid bone marrow suppression, dosage reduction may be required in homozygous-TPMT-deficient persons

• **Tumor lysis syndrome:** monitor for increased potassium, uric acid, phosphate, decreased urine output, calcium

• Renal studies: BUN, serum uric acid, urine CCr, electrolytes before, during therapy

• I&O ratio; report fall in urine output to <30 ml/hr

• Monitor temp; fever may indicate beginning infection; no rectal temp

• **Hepatotoxicity:** Hepatic studies before, during therapy: bilirubin, alk phos, AST, ALT, weekly during beginning therapy, hepatic encephalopathy, toxic hepatitis, ascites can be fatal

• **Bleeding:** hematuria, guaiac, bruising, petechiae, mucosa or orifices, avoid IM inj if platelets are low; blood transfusions may be needed

• **Stomatitis:** buccal cavity for dryness, sores, ulceration, white patches, oral pain, bleeding, dysphagia

Perform/provide:

• Increase fluid intake to 2-3 L/day to prevent urate deposits, calculi formation, unless contraindicated

• Rinsing of mouth tid-qid with water, club soda; brushing of teeth bid-tid with soft brush or cotton-tipped applicators for stomatitis; use unwaxed dental floss

• Storage in tightly closed container in cool environment

Evaluate:

• Therapeutic response: decreased size of tumor, spread of malignancy

Teach patient/family:

• To avoid foods with citric acid, hot or rough texture for stomatitis; to report stomatitis: any bleeding, white spots, ulcerations in mouth; to examine mouth daily, report symptoms

• **Pregnancy:** That contraceptive measures recommended during therapy (D); to avoid breastfeeding

• To drink 10-12 8-oz glasses of fluid/day

• To notify prescriber of fever, chills, sore throat, nausea, vomiting, anorexia, diarrhea, bleeding, bruising, which may indicate blood dyscrasias/infection

• To report signs of infection: fever, sore throat, flulike symptoms

• To report signs of anemia: fatigue, headache, faintness, SOB, irritability

- To report bleeding; to avoid use of razors, commercial mouthwash
- To avoid use of aspirin products, NSAIDs
- To take entire dose at one time

meropenem (Rx)

(mer-oh-pen'em)

Merrem

Func. class.: Antiinfective—miscellaneous

Chem. class.: Carbapenem

ACTION: Bactericidal; interferes with cell-wall replication of susceptible organisms; osmotically unstable cell wall swells, bursts from osmotic pressure

USES: Serious infections caused by gram-positive bacteria: *Streptococcus pneumoniae,* group A β-hemolytic streptococci, enterococcus; gram-negative: *Klebsiella, Proteus, Escherichia coli, Pseudomonas aeruginosa;* appendicitis, peritonitis caused by *viridans* group streptococci; *Bacteroides fragilis, Bacteroides thetaiotaomicron,* bacterial meningitis (≥3 mo)

Unlabeled uses: Febrile, neutropenic, community-acquired pneumonia

CONTRAINDICATIONS: Hypersensitivity to this product, carbapenems, cephalosporins, penicillins

Precautions: Pregnancy (B), breastfeeding, geriatric patients, renal disease, seizure disorder

DOSAGE AND ROUTES

Intraabdominal infections (complicated appendicitis, peritonitis)

- **Adult/child/adolescent >50 kg: IV** 1 g q8hr
- **Infant ≥3 mo/child/adolescent ≤50 kg: IV** 20 mg/kg q8hr

Complicated skin and skin structure infections

- **Adult/adolescents/child >50 kg: IV** 500 mg q8hr
- **Infants ≥3 mo/children/adolescents ≤50 kg: IV** 10 mg/kg q8hr

Bacterial meningitis

- **Adult: IV** 2 g q8hr
- **Infant/child/adolescent ≤50 kg: IV** 40 mg/kg q8hr

Renal disease

- **Adult: IV** CCr 26-50 ml/min, give dose q12hr; CCr 10-25 ml/min, give ½ dose q12hr; CCr <10 ml/min, give ½ dose q24hr

Febrile neutropenia (unlabeled)

- **Adult: IV** 1 g q8hr

Community-acquired pneumonia (CAP) (unlabeled)

- **Adult: IV** 1 g q8hr with ciprofloxacin or with aminoglycoside plus fluoroquinolone

Available forms: Powder for inj 500 mg, 1 g

Administer:

- After C&S is taken

Direct IV route

- Reconstitute 500-mg or 1-g vials with 10, 20 ml of sterile water for inj, respectively; shake to dissolve, let stand until clear (average conc 50 mg/ml); reconstituted sol may be stored for 2 hr at room temp or for 12 hr refrigerated; inject up to 1 g in 5-20 ml over 3-5 min

Intermittent IV INF route

- Vials may be directly reconstituted with compatible inf fluid (NS, D_5W) to 2.5-50 mg/ml; vials with NS can be stored 2 hr at room temp or for ≤18 hr refrigerated, (D_5W solutions) may be stored for up to 1 hr at room temp or ≤8 hr refrigerated; infuse over 15-30 min

Y-site compatibilities: Aminophylline, atenolol, atropine, cimetidine, dexamethasone, digoxin, diphenhydrAMINE, enalaprilat, fluconazole, furosemide, gentamicin, heparin, insulin (regular), metoclopramide, morphine, norepinephrine, PHENobarbital, vancomycin

SIDE EFFECTS

CNS: Seizures, dizziness, weakness, *headache*
CV: Hypotension, palpitations, tachycardia
GI: Diarrhea, nausea, vomiting, pseudomembranous colitis, hepatitis, glossitis
INTEG: *Rash,* urticaria, *pruritus,* pain at inj site, phlebitis, erythema at inj site
RESP: Dyspnea, hyperventilation
SYST: Anaphylaxis, Stevens-Johnson syndrome, angioedema

PHARMACOKINETICS

IV: Onset immediate, peak dose dependent, half-life 1 hr, excreted unchanged in urine (70%)

INTERACTIONS

Increase: meropenem plasma levels—probenecid
Decrease: effect of valproic acid
Drug/Lab Test
Increase: AST, ALT, LDH, BUN, alk phos, bilirubin, creatinine
False positive: direct Coombs' test

NURSING CONSIDERATIONS

Assess:
• Sensitivity to carbapenem antibiotics, penicillins
• Renal disease: lower dose may be required; monitor serum creatinine/BUN before, during therapy
• **Pseudomembranous colitis:** bowel pattern daily; if severe diarrhea, fever, abdominal pain, fatigue occurs, product should be discontinued
• **Infection:** temp, sputum, characteristics of wound before, during, and after treatment
⚠ **Allergic reactions, anaphylaxis:** rash, laryngeal edema, wheezing, urticaria, pruritus; may occur immediately or several days after therapy begins, identify if there has been hypersensitivity to penicillins, cephalosporins, beta-lactams, cross-sensitivity may occur
• **Seizures:** may occur in those with brain lesions, seizure disorder, bacterial meningitis, or renal disease; stop product, notify prescriber if seizures occur
• Overgrowth of infection: perineal itching, fever, malaise, redness, pain, swelling, drainage, rash, diarrhea, change in cough, sputum

Evaluate:
• Therapeutic response: negative C&S; absence of symptoms and signs of infection

Teach patient/family:
• **Pseudomembranous colitis:** to report severe diarrhea
• To report sore throat, bruising, bleeding, joint pain; may indicate blood dyscrasias (rare)
• To report overgrowth of infection: black, furry tongue; vaginal itching; foul-smelling stools
• To avoid breastfeeding; product is excreted in breast milk

TREATMENT OF ANAPHYLAXIS: EPINEPHrine, antihistamines; resuscitate if necessary

mesalamine, 5-ASA (Rx)

(mez-al'a-meen)
Apriso, Asacol, Asacol HD, Canasa, Lialda, Pentasa, Rowasa Salofalk ♣, sf Rowasa
Func. class.: GI antiinflammatory
Chem. class.: 5-Aminosalicylic acid

Do not confuse:
Asacol/Ansaid/Os-Cal

ACTION: May diminish inflammation by blocking cyclooxygenase, inhibiting prostaglandin production in colon; local action only

USES: Mild to moderate active distal ulcerative colitis, proctosigmoiditis, proctitis
Unlabeled uses: Crohn's disease

CONTRAINDICATIONS: Hypersensitivity to this product or salicylates, 5-aminosalicylates

Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, renal disease, sulfite sensitivity, pyloric stenosis

DOSAGE AND ROUTES

Treatment of ulcerative colitis

• **Adult: RECT** 60 ml (4 g) at bedtime, retained for 8 hr × 3-6 wk; **DEL REL TAB (Lialda)** 2.4-4.8 g/day × 8 wk; **DEL REL TAB (Asacol)** 800 mg tid × 6 wk; **CONTROLLED REL CAP (Pentasa)** 1 g qid up to 8 wk; **EXT REL** cap **(Apriso)** 1500 mg (4 caps) QAM daily up to 6 mo, **RECT SUPP** 500 mg bid retained for 1-3 hr × 3-6 wk until remission, may increase tid if needed

Maintenance of remission

• **Adult: PO** (del rel tab: Asacol) 800 mg bid or 400 mg qid; **PO** (del rel cap: Apriso) 1500 mg (4 caps) each AM; **PO** (del rel tab: Lialda) 2.4 g (2 tabs) daily with meal

Available forms: Enema 4 g/60 ml (Rowasa, sf Rowasa); ext rel tab 500 mg; ext rel cap 250, 500 mg (Pentasa); 0.375 g (Apriso); del rel tab 400 mg (Asacol), 800 mg (Asacol HD); del rel tab (Lialda) 1.2 g; rectal supp 1000 mg (Canasa)

Administer:

PO route

• Swallow tabs whole; do not break, crush, or chew tabs

• **Lialda:** take with meal

• **Apriso caps:** take without regard to meals in AM

Rectal suspension

• Product should be given at bedtime, retained until morning (8 hr); empty bowel before insertion, shake well

Rectal suppository

• Moisten before insertion; suppository should be retained for 1-3 hr

SIDE EFFECTS

CNS: *Headache, fever, dizziness,* insomnia, asthenia, weakness, fatigue

CV: Pericarditis, myocarditis, chest pain, palpitations

EENT: Sore throat, cough, pharyngitis, rhinitis

GI: *Cramps, gas, nausea, diarrhea,* rectal pain, constipation

GU: Nephrotoxicity, interstitial nephritis

INTEG: *Rash, itching,* acne

SYST: *Flulike symptoms, malaise,* back pain, peripheral edema, leg and joint pain, arthralgia, dysmenorrhea, anaphylaxis, acute intolerance syndrome

PHARMACOKINETICS

RECT: Primarily excreted in feces but some in urine as metabolite; half-life 1 hr, metabolite half-life 5-10 hr

INTERACTIONS

• Do not give H_2 blockers with Apriso

Increase: nephrotoxicity—NSAIDs

Increase: action, adverse reactions of azaTHIOprine, mercaptopurine

Decrease: mesalamine absorption—lactulose, antacids

Decrease: effect of—warfarin

Drug/Lab Test

Increase: AST, ALT, alk phos, LDH, GGTP, amylase, lipase

NURSING CONSIDERATIONS

Assess:

• **Allergy to salicylates, sulfonamides;** if allergic reactions occur, discontinue product

• Renal studies: BUN, creatinine before, periodically during treatment; renal toxicity may occur

• **Bowel disorders:** cramps, gas, nausea, diarrhea, rectal pain; if severe, product should be discontinued

Evaluate:

• Therapeutic response: absence of pain, bleeding from GI tract, decrease in number of diarrhea stools

Teach patient/family:

• That usual course of therapy is 3-6 wk

• To shake bottle well (rectal susp)

• About method of rectal administration

• To inform prescriber of GI symptoms

• To report abdominal cramping, pain, diarrhea with blood, headache, fever, rash, chest pain; product should be discontinued

M

metformin (Rx)

(met-for'min)

Fortamet, Glucophage, Glucophage XR, Glumetza, Riomet

Func. class.: Antidiabetic, oral

Chem. class.: Biguanide

ACTION: Inhibits hepatic glucose production and increases sensitivity of peripheral tissue to insulin

USES: Type 2 diabetes mellitus

Unlabeled uses: Precocious puberty or early-normal onset of puberty to delay menarche; polycystic ovary syndrome, infertility

CONTRAINDICATIONS: Hypersensitivity; hepatic disease; creatinine ≥1.5 mg/ml (males), ≥1.4 (females); alcoholism; cardiopulmonary disease; acidemia; acute MI; cardiogenic shock; diabetic ketoacidosis; metabolic acidosis

Black Box Warning: History of lactic acidosis

Precautions: Pregnancy (B), breastfeeding, geriatric patients, previous hypersensitivity, thyroid disease, CHF, type 1 diabetes mellitus

DOSAGE AND ROUTES

Type 2 diabetes mellitus

• **Adult: PO** 500 mg bid or 850 mg/day initially then 500 mg weekly or 850 mg q2wk up to 2000 mg/day in divided doses with morning meal, with dosage increased every other wk, max 2550 mg/day, **EXT REL** (Glucophage XR) 500 mg daily with evening meal, may increase by 500 mg per wk, max 2000 mg/day; (Glumetza) 1000 mg daily with food, preferably with PM meal, may increase by 500 mg per wk, max 2000 mg daily; (Fortamet) 500-1000 mg daily with PM meal, may increase by 500 mg per wk, max 2550 mg daily; regular rel or oral sol 2000-2500 mg/day for ext rel tab, depending on formulation

• **Geriatric: PO** Use lowest effective dose

To delay early menarche and to prolong pubertal growth with early onset of puberty (unlabeled)

• **Child 8-9 yr: PO** 825 mg/day with PM meal

To delay clinical puberty and early menarche in precocious puberty (unlabeled)

• **Child >6 yr: PO** 425 mg/day with PM meal

Polycystic ovary syndrome/ infertility related to hyperinsulinemia secondary to polycystic ovary syndrome (unlabeled)

• **Adult (female): PO** 500 mg tid

Available forms: Tabs 500, 850, 1000 mg; ext rel tab 500, 850, 1000 mg; oral sol 500 mg/5 ml

Administer:

PO route

• **Immediate rel product:** twice a day given with meals to decrease GI upset, and provide the best absorption; immediate rel tabs crushed, mixed with meal, fluids for patients with difficulty swallowing

• **Ext rel product** may also be taken as single dose; titrate slowly to therapeutic response, side effect tolerance

• Ext rel tabs: do not chew, break, crush

SIDE EFFECTS

CNS: *Headache, weakness, dizziness, drowsiness,* tinnitus, fatigue, vertigo, *agitation*

CV: Heart failure

ENDO: Lactic acidosis, hypoglycemia

GI: *Nausea, vomiting, diarrhea,* heartburn, anorexia, metallic taste

HEMA: Thrombocytopenia, decreased vit B_{12} levels

INTEG: Rash

PHARMACOKINETICS

Excreted by kidneys unchanged 35%-50%, half-life 1½-5 hr, terminal 6-20 hr, peak 1-3 hr

INTERACTIONS

• Do not give with radiologic contrast media; may cause renal failure
• Do not use with dofetilide; may cause lactic acidosis

Increase: metformin level—cimetidine, digoxin, morphine, procainamide, quiNIDine, ranitidine, triamterene, vancomycin

Increase: hyperglycemia—calcium channel blockers, corticosteroids, estrogens, oral contraceptives, phenothiazines, sympathomimetics, diuretics, phenytoin, β-blockers

Drug/Herb

Increase: hyperglycemia—glucosamine
Increase: hypoglycemia—garlic, green tea, horse chestnut

Drug/Lab Test

Decrease: vit B12

NURSING CONSIDERATIONS

Assess:

• **Hypoglycemic reactions** (sweating, weakness, dizziness, anxiety, tremors, hunger); hyperglycemic reactions soon after meals; these occur rarely with product, may occur when product combined with sulfonylureas
• CBC (baseline, q3mo) during treatment; check LFTs periodically, AST, LDH, renal studies: BUN, creatinine during treatment; glucose, A1c; folic acid, vit B_{12} q1-2yr
• **Surgery:** product should be discontinued temporarily for surgical procedures when patient is NPO or if contrast media is used, resume when patient is eating

Black Box Warning: Lactic acidosis: malaise, myalgia, abdominal distress; risk increases with age, poor renal function; monitor electrolytes, lactate, pyruvate, blood pH, ketones, glucose; suspect in any diabetic patient with metabolic acidosis, with ketoacidosis; immediately stop product if hypoxemia or significant renal dysfunction occurs

Perform/provide:

• Conversion from other oral hypoglycemic agents; change may be made without gradual dosage change; monitor serum glucose, urine ketones tid during conversion
• Storage in tight container in cool environment

Evaluate:

• Therapeutic response: decrease in polyuria, polydipsia, polyphagia; clear sensorium; absence of dizziness; stable gait; blood glucose, A1c at normal level

Teach patient/family:

Black Box Warning: Lactic acidosis: hyperventilation, fatigue, malaise, chills, myalgia, somnolence; to notify prescriber immediately; stop product

• To regularly self-monitor blood glucose with blood-glucose meter
• About symptoms of hypo/hyperglycemia, what to do about each (rare)
• That product must be continued on daily basis; about consequences of discontinuing product abruptly
• To avoid OTC medications, alcohol unless approved by prescriber
• That diabetes is a lifelong illness; that product is not a cure, only controls symptoms
• To carry emergency ID and glucagon emergency kit
• That Glucophage XR tab may appear in stool
• To take with meals, not to break, crush, chew ext rel product
• About signs, symptoms of hypo/hyperglycemic reactions

⚠ HIGH ALERT

methadone (Rx)

(meth'a-done)

Dolophine, Metadol ✚, Methadose

Func. class.: Opioid analgesic

Chem. class.: Synthetic diphenylheptane derivative

Controlled Substance Schedule II

Do not confuse:
methadone/methylphenidate

ACTION: Depresses pain impulse transmission at the spinal cord level by interacting with opioid receptors; produces CNS depression

USES: Severe pain, opioid withdrawal

CONTRAINDICATIONS: Hypersensitivity to this product or chlorobutanol (inj); asthma, ileus

Black Box Warning: Respiratory depression

Precautions: Pregnancy (C), breastfeeding, children <18 yr, geriatric patients, addictive personality, increased intracranial pressure, MI (acute), severe heart disease, respiratory depression, pulmonary/renal/hepatic disease, respiratory insufficiency, torsades de pointes, COPD

Black Box Warning: QT prolongation, pain, substance abuse, potential for overdose, poisoning, accidental exposure

DOSAGE AND ROUTES

Severe pain

• **Adult: PO/SUBCUT/IM/IV** 2.5-10 mg q8-12hr prn

Opioid withdrawal

• **Adult including pregnant woman:** 20-30 mg initially unless low opioid tolerance expected; additional 5-10 mg q2-4hr as needed after initial dose; if symptoms continue, may give for ≤5 days

Renal disease

• **Adult:** may need to be modified

Available forms: Inj 10 mg/ml; tabs 5, 10 mg; oral sol 5, 10 mg/5 ml, 10 mg/ml

Administer:

IM route

• Rotating inj sites, give deep in large muscle mass (IM)

SUBCUT route

• Pain and induration may occur at site

SIDE EFFECTS

CNS: *Drowsiness, dizziness, confusion, headache, sedation,* euphoria, seizures

CV: Palpitations, bradycardia, change in B/P, cardiac arrest, shock, hypotension, torsades de pointes, QT prolongation

EENT: Tinnitus, blurred vision, miosis, diplopia

GI: *Nausea, vomiting, anorexia, constipation, cramps,* biliary tract spasm

GU: Increased urinary output, dysuria, urinary retention, impotence

INTEG: *Rash,* urticaria, bruising, flushing, diaphoresis, pruritus

RESP: Respiratory depression, respiratory arrest

PHARMACOKINETICS

Metabolized by liver; excreted by kidneys; crosses placenta; excreted in breast milk; half-life 8-59 hr, extended interval with continued dosing; 90% bound to plasma proteins

PO: Onset 30-60 min, peak 1-1.5 hr, duration 6-8 hr, cumulative 22-48 hr; PO half as active as INJ

SUBCUT/IM: Onset 10-20 min, peak 1½-2 hr, duration 4-6 hr, cumulative 22-48 hr

INTERACTIONS

⚠ Unpredictable reactions: MAOIs; do not use together

• Do not use within 2 wk of selegiline

Increase: effects with other CNS depressants—alcohol, opiates, sedative/hyp-

notics, antipsychotics, skeletal muscle relaxants
Increase: toxicity—CYP3A4 inhibitors (aprepitant, antiretroviral protease inhibitors, clarithromycin, danazol, delavirdine, diltiazem, erythromycin, fluconazole, FLUoxetine, fluroxamine, imatinib, ketoconazole, mibefradil, nefazodone, telithromycin, voriconazole)
Increase: QT prolongation—class IA antiarrhythmics (disopyramide, procainamide, quiNIDine), class III antiarrhythmics (amiodarone, dofetilide, ibutilide, sotalol), astemizole, arsenic trioxide, cisapride, chloroquine, clarithromycin, levomethadye, pentamidine, some phenothiazines, pimozide, terfenadine
Decrease: analgesia—rifampin, phenytoin, nalbuphine, pentazine
Decrease: methadone effect—CYP3A4 inducers (barbiturates, bosentan, carBAMazepine, efavirenz, phenytoins, nevirapine, rifabutin, rifampin), withdrawal symptoms may occur

Drug/Food
• Avoid use with grapefruit juice

Drug/Herb
• Avoid use with St. John's wort; withdrawal may result
Increase: CNS depression—chamomile, hops, kava, valerian

Drug/Lab Test
Increase: amylase, lipase

NURSING CONSIDERATIONS

Assess:
• **Pain:** type, location, intensity, grimacing before, $1^1/_2$-2 hr after administration; use pain scoring
• I&O ratio; check for decreasing output; may indicate urinary retention
• CNS changes: dizziness, drowsiness, hallucinations, euphoria, LOC, pupil reaction
• Allergic reactions: rash, urticaria

Black Box Warning: Respiratory dysfunction: respiratory depression, character, rate, rhythm; notify prescriber if respirations are <10/min

Black Box Warning: QT prolongation: may be dose related or use with other products that increase QT

Black Box Warning: Accidental exposure: make sure product is not accessible to children, pets

Black Box Warning: Overdose, poisoning: advise persons involved in correct use

Black Box Warning: Substance abuse: may occur but has less psychological dependence than other opiate agonists

• Opioid detoxification: no analgesia occurs, only prevention of withdrawal symptoms

Black Box Warning: B/P, pulse, ECG; hypotension, palpitations may occur

• Bowel changes, bulk, fluids, laxatives should be used for constipation

Perform/provide:
• Storage in light-resistant container at room temp
• Assistance with ambulation

Evaluate:
• Therapeutic response: decrease in pain, successful opioid withdrawal

Teach patient/family:
• To report any symptoms of CNS changes, allergic reactions
• That physical dependency may result from extended use
⚠ That withdrawal symptoms may occur: nausea, vomiting, cramps, fever, faintness, anorexia
• To maintain proper hydration; to avoid alcohol use

TREATMENT OF OVERDOSE:

Naloxone (Narcan) 0.2-0.8 mg IV, O_2, IV fluids, vasopressors

methimazole (Rx)

(meth-im'a-zole)

Tapazole

Func. class.: Thyroid hormone antagonist (antithyroid)

Chem. class.: Thioamide

Do not confuse:
methimazole/metoprolol/minoxidil

ACTION: Inhibits synthesis of thyroid hormones by decreasing iodine use in manufacture of thyroglobin and iodothyronine; does not affect circulatory T_4, T_3

USES: Hyperthyroidism, preparation for thyroidectomy, thyrotoxic crisis; thyroid storm when PTU is contraindicated

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, hypersensitivity

Precautions: Infection, bone marrow suppression, hepatic disease, bleeding disorders

DOSAGE AND ROUTES

Hyperthyroidism

• **Adult: PO** 15 mg/day (mild hyperthyroidism); 30-40 mg/day (moderate to severe); 60 mg/day (severe); maintenance 5-15 mg/day; may be divided

• **Child: PO** 0.4 mg/kg/day in divided doses q8hr; continue until euthyroid; maintenance dose 0.2 mg/kg/day in divided doses q8hr, max 30 mg/24 hr; may be divided

Preparation for thyroidectomy

• **Adult and child: PO** same as above; iodine may be added × 10 days before surgery

Thyrotoxic crisis

• **Adult and child: PO** same as hyperthyroidism with iodine and propranolol

Available forms: Tabs 5, 10, 15, 20 mg

Administer:

• With meals to decrease GI upset

• At same time each day to maintain product level

• Lowest dose that relieves symptoms; discontinue before RAIU

SIDE EFFECTS

CNS: *Drowsiness, headache, vertigo, fever,* paresthesias, neuritis

ENDO: *Enlarged thyroid*

GI: *Nausea, diarrhea, vomiting,* jaundice, hepatitis, loss of taste

GU: Nephritis

HEMA: Agranulocytosis, leukopenia, thrombocytopenia, hypothrombinemia, lymphadenopathy, bleeding, vasculitis

INTEG: *Rash, urticaria, pruritus, alopecia, hyperpigmentation,* lupuslike syndrome

MS: Myalgia, arthralgia, nocturnal muscle cramps

PHARMACOKINETICS

Onset 12-18 hr; duration 36-72 hr; half-life 4-12 hr; excreted in urine, breast milk; crosses placenta

INTERACTIONS

Increase: bone marrow depression—radiation, antineoplastic agents

Increase: response to digoxin

Decrease: effectiveness—amiodarone, potassium iodide

Decrease: Anticoagulant effect—warfarin

Drug/Lab Test

Increase: PT, AST, ALT, alk phos

NURSING CONSIDERATIONS

Assess:

• **Hyperthyroidism:** palpitation, nervousness, loss of hair, insomnia, heat intolerance, weight loss, diarrhea

• **Hypothyroidism:** constipation, dry skin, weakness, fatigue, headache, intolerance to cold, weight gain; adjustment may be needed

• Pulse, B/P, temp

• I&O ratio; check for edema: puffy hands, feet, periorbits; these indicate hypothyroidism

• Weight daily; same clothing, scale, time of day

• T_3, T_4, which are increased; serum TSH, which is decreased; free thyroxine index, which is increased if dosage too low; discontinue product 3-4 wk before RAIU

Blood dyscrasias: CBC, leukopenia, thrombocytopenia, agranulocytosis; if these occur, product should be discontinued and other treatment initiated, may occur at higher doses

• **Hypersensitivity:** rash, enlarged cervical lymph nodes; product may have to be discontinued

• **Hypoprothrombinemia:** bleeding, petechiae, ecchymosis

• **Clinical response:** after 3 wk should include increased weight; decreased T_4, pulse

Bone marrow suppression: sore throat, fever, fatigue

Perform/provide:

• Storage in light-resistant container

• Increased fluids to 3-4 L/day unless contraindicated

Evaluate:

• Therapeutic response: weight gain, decreased pulse, decreased T_4, B/P

Teach patient/family:

• Not to breastfeed

• To take pulse daily

• To report redness, swelling, sore throat, mouth lesions, fever, which indicate blood dyscrasias

• To keep graph of weight, pulse, mood

• To avoid OTC products, seafood that contains iodine, other iodine products

• Not to discontinue product abruptly because thyroid crisis may occur; stress patient response

• That response may take several months if thyroid is large

• **Symptoms and signs of overdose:** periorbital edema, cold intolerance, mental depression

• **Symptoms of inadequate dose:** tachycardia, diarrhea, fever, irritability

• To take medication as prescribed; not to skip or double dose

⚠ HIGH ALERT

methotrexate (Rx)

(meth-oh-trex'ate)

Rheumatrex, Trexall

Func. class.: Antineoplastic-antimetabolite (vesicant)

Chem. class.: Folic acid antagonist

Do not confuse:

methotrexate/metolazone/mitoXANtrone

ACTION: Inhibits an enzyme that reduces folic acid, which is needed for nucleic acid synthesis in all cells; specific to S phase of cell cycle; immunosuppressive

USES: Acute lymphocytic leukemia; in combination for breast, lung, head, neck carcinoma; lymphosarcoma, gestational choriocarcinoma, hydatidiform mole, psoriasis, RA, mycosis fungoides, osteosarcoma

Unlabeled uses: Burkitt's lymphoma, bladder or ovarian cancer, carcinomatous meningitis, desmoid tumor, fibromatosis, asthma, active Crohn's disease, ulcerative colitis, GVHD prophylaxis, ectopic pregnancy, pregnancy termination, psoriatic arthritis, pruritus due to cholestasis or primary biliary cirrhosis, SLE, sarcoidosis

CONTRAINDICATIONS: Hypersensitivity, leukopenia ($<3500/mm^3$), thrombocytopenia ($<100,000/mm^3$), anemia; psoriatic patients with severe renal disease, alcoholism, HIV

Black Box Warning: Pregnancy (X), hepatic disease

Precautions: Breastfeeding, children

Black Box Warning: Renal disease, ascites, diarrhea, exfoliative dermatitis, infection, intrathecal administration, lymphoma, pleural effusion, pulmonary disease, radiation therapy, stomatitis, tumor lysis syndrome, renal impairment

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DOSAGE AND ROUTES

Acute lymphocytic leukemia

• **Adult and child: PO/IM/IV** 3.3 mg/m²/day × 4-6 wk until remission then 20-30 mg/m² **PO/IM** weekly in 2 divided doses or 2.5 mg/kg **IV** × 2 wk

Choriocarcinoma

• **Adult and child: PO/IM** 15-30 mg/day × 5 days then off 1 wk; may repeat

Meningeal leukemia

• **Adult and child:** 12 mg/m² **INTRATHECALLY** q2-5days until CSF is normal then 1 additional dose, max 15 mg

Lymphosarcoma (stage III)

• **Adult: PO/IM/IV** 0.625-2.5 mg/kg/day

Osteosarcoma

• **Adult and child: IV** 12 g/m² given over 4 hr then leucovorin rescue

Mycosis fungoides

• **Adult: PO** 5-50 mg q wk or 15-37.5 mg twice weekly; **IV/IM** 50 mg q week or 15-37.5 mg twice weekly

Psoriasis

• **Adult: PO/IM/IV** 10-25 mg/wk or 2.5 mg **PO** q12hr × 3 doses/wk, may increase to 25 mg/wk

Breast cancer

• **Adult: IV** 40-60 mg/m² on day 1 of every 21-28 days with other antineoplastics

Epidermal head/neck cancer

• **Adult/child: IV** 40 mg/m² on days 1 and 15, q21days alone or in combination with bleomycin, CISplatin

• **Adult: PO** 25-50 mg/m² q7days

• **Child: PO** 7.5-30 mg/m² q7-14days

Rheumatoid arthritis

• **Adult: PO** 7.5 mg/wk or in divided doses of 2.5 mg q12hr × 3 given per wk; max 20 mg/wk

Polyarticular-course juvenile RA

• **Child: PO/IM** 10 mg/m²/wk

Burkitt's lymphoma (stages I, II, III)

• **Adult/adolescent/child: IV** 200 mg/m² days 8 and 15 q21days with bleomycin, cyclophosphamide, vinCRIStine, dexamethasone

Bladder cancer (unlabeled)

• **Adult: IV** 30 mg/m² on days 1, 15, 22 q28days in combination with vinBLAStine, DOXOrubicin, CISplatin (MVAC) regimen

Active Crohn's disease/ulcerative colitis (unlabeled)

• **Adult: IM** 25 mg/wk; **SUBCUT** 15 mg/kg/wk × 16 wk

GVHD prophylaxis (unlabeled)

• **Adult and child: IV** 15 mg/m² on day 1 after transplant then 10 mg/m² on days 3, 6, 11

Ectopic pregnancy (unlabeled)

• **Adult: IM** 50 mg/m² may be used in combination with mifepristone

Pregnancy termination prior to 63rd day of pregnancy (unlabeled)

• **Adult: IM** 50 mg/m² then intravaginal misoprostol 5-7 days later

Psoriatic arthritis (unlabeled)

• **Adult: PO** 5-7.5 mg weekly

Available forms: Tabs 2.5, 5, 7.5, 10, 15 mg; inj 25 mg/ml; powder for inj 1 g

Administer:

• Using chemotherapeutic handling

• Antiemetic 30-60 min before product

• Allopurinol or sodium bicarbonate to maintain uric acid levels, alkalinization of urine (pH >7.5), adequate fluids

Direct IV route

• After diluting 5 mg/2 ml of sterile water for inj; give through Y-tube or 3-way stopcock

Intermittent/Continuous IV INF route

• Further dilute in D5W, D5NS, NS, prior to infusion check patency of vein, flush with 5-10 ml of D5W, NS, infuse at 4-20 mg/hr or prescribed rate

⚠ **Leucovorin rescue:** leucovorin calcium within 24 hr of product to prevent tissue damage; check agency policy, continue until methotrexate level $<10^{-8}$ m

IV INF intermediate or high dose (500 mg/m² over <4 hr or >1 g/m² over >4 hr): confirm WBC >1500/mm³, neutrophils >200/mm³, platelets >75,000/mm³, serum bilirubin <1.2 mg/dl, serum creatinine WNL, SGPT <450 U, creatinine clearance >60 ml/min

⚠ Give sodium bicarbonate tabs or IV fluids to prevent precipitation of product at high doses; urine pH should be >7; may need to reduce dosage if BUN 20-30

mg/dl or creatinine is 1.2-2 mg/dl; stop product if BUN >30 mg/dl or creatinine >2 mg/dl

Additive compatibilities: Cephalothin, cyclophosphamide, cytarabine, fluorouracil, hydrOXYzine, mercaptopurine, ondansetron, sodium bicarbonate, vinCRIStine

Solution compatibilities: Amino acids, 4.25%/D_{25}, D_5W, sodium bicarbonate 0.05 mol/L, sodium chloride 0.9%

Syringe compatibilities: Bleomycin, CISplatin, cyclophosphamide, doxapram, DOXOrubicin, fluorouracil, furosemide, heparin, leucovorin, mitoMYcin, vinBLAStine, vinCRIStine

Y-site compatibilities: Allopurinol, amifostine, amphotericin B cholesteryl, asparaginase, aztreonam, bleomycin, cefepime, cefTRIAXone, cimetidine, CISplatin, cyclophosphamide, cytarabine, DAUNOrubicin, dexchlorpheniramine, diphenhydrAMINE, DOXOrubicin, DOXOrubicin liposome, etoposide, famotidine, filgrastim, fludarabine, fluorouracil, furosemide, gallium, ganciclovir, granisetron, heparin, HYDROmorphone, imipenem-cilastatin, leucovorin, LORazepam, melphalan, mesna, methylPREDNISolone, metoclopramide, mitoMYcin, morphine, ondansetron, oxacillin, PACLitaxel, piperacillin/tazobactam, prochlorperazine, ranitidine, sargramostim, teniposide, thiotepa, vinBLAStine, vinCRIStine, vinorelbine

Intrathecal route

Black Box Warning: Use preservative-free sol, reconstitute with NS; dose should be drawn into 5- to 10-ml syringe after LP, vol of CSF should be withdrawn equal to vol of methotrexate; allow CSF to flow into syringe and mix, inject over 15-30 sec with bevel of needle upward

SIDE EFFECTS

CNS: Dizziness, seizures, leukoencephalopathy, headache, confusion, encephalopathy, hemiparesis, malaise, fatigue, chills, fever; arachnoiditis (intrathecal)

EENT: Blurred vision, optic neuropathy

GI: *Nausea, vomiting, anorexia, diarrhea, ulcerative stomatitis,* hepatotoxicity, cramps, ulcer, gastritis, GI hemorrhage, abdominal pain, hematemesis, hepatic fibrosis, acute toxicity

GU: Urinary retention, renal failure, menstrual irregularities, defective spermatogenesis, hematuria, azotemia, uric acid nephropathy

HEMA: Leukopenia, thrombocytopenia, myelosuppression, anemia

INTEG: *Rash, alopecia,* dry skin, urticaria, photosensitivity, folliculitis, vasculitis, petechiae, ecchymosis, acne, alopecia, severe fatal skin reaction

RESP: Methotrexate-induced lung disease

SYST: Sudden death, *Pneumocystis jiroveci,* tumor lysis syndrome

PHARMACOKINETICS

Not metabolized; excreted in urine (unchanged); crosses placenta, blood-brain barrier; 50% plasma protein bound; terminal half-life 10-12 hr

PO: Readily absorbed

PO/IM/IV: Onset, duration unknown

IT: Onset, peak, duration unknown

INTERACTIONS

Do not use with proton pump inhibitors

Increase: toxicity—salicylates, sulfa products, other antineoplastics, radiation, alcohol, probenecid, NSAIDs, phenylbutazone, theophylline, penicillins

Increase: hypoprothrombinemia—oral anticoagulants

Increase: hepatitis—acitretin, avoid concurrent use

Decrease: effect of oral digoxin, vaccines, phenytoin, fosphenytoin

Decrease: effect of methotrexate—folic acid supplements

NURSING CONSIDERATIONS

Assess:

• Make sure product is taken weekly in RA, JRA

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Black Box Warning: Infection: those with active infections should be treated for infection before product use; monitor temperature, fever may indicate beginning of infection

• Make sure drug-drug interacting products are discontinued before therapy, and do not resume until methotrexate level is safe

⚠ CBC, differential, platelet count weekly; avoid use until WBC is >1500/mm^3 or platelet count is >75,000/mm^3, neutrophils >200/mm^3; notify prescriber; WBC, platelet nadirs occur on day 7; monitor

Black Box Warning: Renal disease: avoid use in renal failure, BUN, serum uric acid, urine CCr, electrolytes before, during therapy; I&O ratio; report fall in urine output to <30 ml/hr

• Bleeding time, coagulation time during treatment; bleeding: hematuria, guaiac, bruising, or petechiae in mucosa or orifices

• Effects of alopecia on body image; discuss feelings about body changes

Black Box Warning: Pulmonary toxicity: those with ascites or pleural effusion at greater risk for toxicity; fluid should be removed before treatment; monitor plasma methotrexate levels

Black Box Warning: Tumor lysis syndrome: hyperkalemia, hyperphosphatemia, hyperuricemia, hypocalcemia, decreased urine output; use aggressive hydration, allopurinol to correct severe electrolyte imbalances, renal toxicity

Black Box Warning: Hepatotoxicity: jaundiced skin and sclera, dark urine, clay-colored stools, pruritus, abdominal pain, fever, diarrhea, hepatic studies before and during therapy: bilirubin, alk phos, AST, ALT; liver biopsy should be done before start of therapy (psoriasis)

• Monitor methotrexate levels, adjust leucovorin dose based on level

• Buccal cavity for dryness, sores, ulceration, white patches, oral pain, bleeding, dysphagia

Black Box Warning: Serious skin reaction: Stevens-Johnson syndrome, exfoliate dermatitis, skin necrosis, erythema multiform may occur within days of receiving product by any route, product should be discontinued

• **Strokelike encephalopathy:** common in high-dose therapy; assess for confusion, hemiparesis, seizures, coma; usually transient

• **Rheumatoid arthritis:** ROM, pain, joint swelling before, during treatment

• **Psoriasis:** skin lesions before, during treatment

Perform/provide:

• Increased fluid intake to 2-3 L/day to prevent urate deposits, calculi formation unless contraindicated

• Rinsing of mouth tid-qid with water, club soda; brushing of teeth bid-tid with soft brush or cotton-tipped applicators for stomatitis; use unwaxed dental floss

• Storage in tightly closed container in cool environment; store injection, powder for inj in dark, dry area

Evaluate:

• Therapeutic response: decreased tumor size, spread of malignancy; decreased joint inflammation, pain in RA

Teach patient/family:

Black Box Warning: To report any complaints, side effects to nurse or prescriber: black tarry stools, chills, fever, sore throat, bleeding, bruising, cough, SOB, dark or bloody urine, seizures

• That hair may be lost during treatment; that wig or hairpiece may make patient feel better; that new hair may be different in color, texture (alopecia rare)

• To avoid foods with citric acid, hot or rough texture if stomatitis is present

• To report stomatitis and any bleeding, white spots, ulcerations in mouth to prescriber; to examine mouth daily; to report symptoms to nurse; to use good oral hygiene

Black Box Warning: That contraceptive measures are recommended during therapy and for at least 8 wk after cessation of therapy for women and men; to discontinue breastfeeding; that toxicity to infant may occur; pregnancy (X)

- To drink 10-12 glasses of fluid/day
- To avoid alcohol, salicylates, live vaccines
- To avoid use of razors, commercial mouthwash
- To use sunblock to prevent burns
- To use good dental care, to prevent overgrowth of infection in the mouth
- How to use this product with leucovorin rescue
- To continue leucovorin until told it is safe to stop
- To report CNS symptoms, vision changes
- To report fever, other symptoms of infection
- To report decreased urine output

methylcellulose (OTC)

(meth-ill-sell'yoo-lose)

Citrucel, Equaline Fiber Therapy, Fiber Therapy, Leader Fiber Therapy, Walgreens Fiber Therapy

Func. class.: Laxative, bulk forming

Chem. class.: Hydrophilic semisynthetic cellulose derivative

Do not confuse:
Citrucel/Citracal

ACTION: Attracts water, expands in intestine to increase peristalsis; absorbs excess water in stool; decreases diarrhea

USES: Chronic constipation

CONTRAINDICATIONS: Hypersensitivity, GI obstruction, hepatitis

DOSAGE AND ROUTES

- **Adult: PO** ≤6 g/day in divided doses
- **Child 6-12 yr: PO** 3 g/day in divided doses

Available forms: Powder 105 mg/g, 196 mg/g; tab 500 mg

Administer:

PO route

- Alone for better absorption; do not take within 1 hr of other products
- In AM or PM (oral dose)

SIDE EFFECTS

GI: Obstruction, abdominal distention

PHARMACOKINETICS

PO: Onset 12-24 hr, peak 1-3 days

INTERACTIONS

Decrease: absorption—digoxin, nitrofurantoin, salicylates, tetracyclines, oral anticoagulants

Drug/Herb

Increase: laxative action—flax senna

NURSING CONSIDERATIONS

Assess:

- Blood, urine electrolytes if used often
- I&O ratio to identify fluid loss
- Cause of constipation; lack of fluids, bulk, exercise, constipating products
- Cramping, rectal bleeding, nausea, vomiting; product should be discontinued

Evaluate:

- Therapeutic response: decrease in constipation

Teach patient/family:

- To mix powder in water, take with full glass of water
- To increase fluid intake
- That normal bowel movements do not always occur daily
- Not to use in presence of abdominal pain, nausea, vomiting
- To notify prescriber if constipation unrelieved or if symptoms of electrolyte imbalance occur: muscle cramps, pain, weakness, dizziness, excessive thirst

methyldopa/ methyldopate (Rx)

(meth-ill-doe'pa)

Func. class.: Antihypertensive

Chem. class.: Centrally acting α-adrenergic inhibitor

Do not confuse:
methyldopa/L-dopa/levodopa

ACTION: Stimulates central inhibitory α-adrenergic receptors or acts as false transmitter, resulting in reduction of arterial pressure

USES: Hypertension, hypertensive crisis

CONTRAINDICATIONS: Active hepatic disease, hypersensitivity

Precautions: Pregnancy (B), geriatric patients, cardiac disease, autoimmune disease, depression, dialysis, hemolytic anemia, Parkinson's disease, pheochromocytoma, sulfite hypersensitivity

DOSAGE AND ROUTES

- **Adult: PO** 250-500 mg bid or tid then adjusted q2days as needed, 0.5-2 g/day in 2-4 divided doses (maintenance), max 3 g/day; **IV** 250-500 mg in 100 ml D_5W q6hr, run over 30-60 min, max 1 g q6hr, switch to oral as soon as possible
- **Geriatric: PO** 125 mg bid-tid, increase q2days as needed, max 3 g/day
- **Child: PO** 10 mg/kg/day in 2-4 divided doses, max 65 mg/kg or 3 g/day, whichever is less; **IV** 20-40 mg/kg/day in 4 divided doses, max 65 mg/kg or 3 g, whichever is less

Available forms: *Methyldopa:* tabs 250, 500 mg; *methyldopate:* inj 50 mg/ml

Administer:

PO route

- Increase in dose should be done in the evening to minimize drowsiness

Intermittent IV INF route

- After diluting with 100 ml D_5W; run over $^1/_2$-1 hr

Y-site compatibilities: Alfentanil, amikacin, aminophylline, anidulafungin, ascorbic acid, atenolol, atracurium, atropine, aztreonam, benztropine, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, caspofungin, cefamandole, ceFAZolin, cefmetazole, cefonicid, cefotaxime, cefoTEtan, cefOXitin, ceftAZidime, ceftizoxime, ceftRIAXone, cefuroxime, cephalothin, chlorproMAZINE, cimetidine, clindamycin, cyanocobalamin, cycloSPORINE, DACTINomycin, DAPTOmycin, dexamethasone, digoxin, diltiazem, diphenhydrAMINE, DOCEtaxel, DOPamine, doxycycline, enalaprilat, ePHEDrine, EPINEPHrine, epoetin alfa, ertapenem, erythromycin, esmolol, etoposide, etoposide phosphate, famotidine, fenoldopam, fentaNYL, fluconazole, fludarabine, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, heparin, hydrocortisone, HYDROmorphone, hydrOXYzine, IDArubicin, insulin (regular), irinotecan, isoproterenol, labetalol, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, meperidine, metaraminol, methicillin, methoxamine, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, mezlocillin, miconazole, midazolam, milrinone, minocycline, mitoXANtrone, morphine, moxalactam, multiple vitamins, mycophenolate mofetil, nafcillin, nalbuphine, naloxone, netilmicin, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxacillin, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pamidronate, pancuronium, pantoprazole, papaverine, PEMEtrexed, penicillin G potassium/sodium, pentazocine, phentolamine, phenylephrine, phytonadione, piperacillin, polymyxin B, potassium chloride, procainamide, prochlorperazine, promethazine, propranolol, protamine, pyridoxine, quiNIDine, ranitidine, ritodrine,

sodium bicarbonate, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiamine, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, tobramycin, tolazoline, trimetaphan, urokinase, vancomycin, vasopressin, vecuronium, verapamil, vinorelbine, voriconazole, zoledronic acid

SIDE EFFECTS

CNS: *Drowsiness, weakness, dizziness, sedation, headache,* depression, psychosis paresthesias, parkinsonism, Bell's palsy, nightmares
CV: Bradycardia, myocarditis, orthostatic hypotension, angina, edema, weight gain, CHF, paradoxic pressor response (IV)
EENT: Nasal congestion
ENDO: Breast enlargement, gynecomastia, amenorrhea
GI: Nausea, vomiting, diarrhea, constipation, hepatic dysfunction, sore or "black" tongue, pancreatitis, colitis, flatulence
GU: Impotence, failure to ejaculate
HEMA: Leukopenia, thrombocytopenia, hemolytic anemia, granulocytopenia, positive Coombs' test
INTEG: Rash, toxic epidermal necrolysis, lupuslike syndrome

PHARMACOKINETICS

PO: Peak 2-4 hr, duration 12-24 hr
IV: Peak 2 hr, duration 10-16 hr
Metabolized by liver, excreted in urine, half-life 2 hr

INTERACTIONS

• Lithium toxicity: lithium
Increase: pressor effect—sympathomimetic amines, MAOIs; do not use concurrently with MAOIs
Increase: hypotension, CNS toxicity—levodopa
Increase: hypotension—diuretics, other antihypertensives
Increase: psychosis—haloperidol
Increase: CNS depression—alcohol, antihistamines, antidepressants, analgesics, sedative/hypnotics
Increase: B/P—phenothiazines, β-blockers, amphetamines, NSAIDs, tricyclics, barbiturates
Increase: hypoglycemia—TOLBUTamide
Decrease: methyldopa absorption—iron
Drug/Lab Test
Increase: creatinine, LFTs
Decrease: platelets, WBC, Hgb/HcT
Interference: urinary uric acid, serum creatinine, AST
False increase: urinary catecholamines

NURSING CONSIDERATIONS

Assess:
• Blood studies: neutrophils, decreased platelets
• **Hemolytic anemia:** Direct Coombs' test before, after 6, 12 mo of therapy, a positive test may indicate hemolytic anemia; usually reverses within weeks to months after discontinuing treatment, monitor Hgb/HcT and RBC; do not start therapy in those with hemolytic anemia
• Baselines of renal, hepatic studies before therapy begins
• **Hypertension:** B/P when beginning treatment, periodically thereafter; report significant changes
• **Allergic reaction:** rash, fever, pruritus, urticaria; product should be discontinued if antihistamines fail to help
• CNS symptoms, especially in geriatric patients; depression, change in mental status
• **CHF:** edema, dyspnea, wet crackles, B/P
• Renal symptoms: polyuria, oliguria, urinary frequency; I&O ratio, weight; report weight gain >5 lb
• **Product tolerance:** may occur within 3 mo of starting treatment, a dosage change and other products may be needed
Evaluate:
• Therapeutic response: decrease in B/P with hypertension
Teach patient/family:
• To avoid hazardous activities
• Not to discontinue product abruptly because withdrawal symptoms may oc-

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cur: anxiety, increased B/P, headache, insomnia, increased pulse, tremors, nausea, sweating
- Not to use OTC (cough, cold, allergy) products unless directed by prescriber
- To rise slowly to sitting or standing position to minimize orthostatic hypotension
- To notify prescriber of mouth sores, sore throat, fever, swelling of hands or feet, irregular heartbeat, chest pain, signs of angioedema
- That excessive perspiration, dehydration, vomiting, diarrhea may lead to fall in B/P; to consult prescriber
- That dizziness, fainting, lightheadedness may occur during first few days of therapy
- That compliance is necessary; not to skip or stop product unless directed by prescriber
- That product may cause skin rash or impaired perspiration

TREATMENT OF OVERDOSE: Gastric evacuation, sympathomimetics may be indicated; if severe, hemodialysis

methylergonovine (Rx)

(meth-ill-er-goe-noe'veen)
Func. class.: Oxytocic
Chem. class.: Ergot alkaloid

ACTION: Stimulates uterine, vascular, and smooth muscle, thereby causing contractions; decreases bleeding; arterial vasoconstriction

USES: Treatment of hemorrhage postpartum or postabortion, uterine contractions

CONTRAINDICATIONS: Pregnancy (other than obstetric delivery/abortion), hypertension, preeclampsia, eclampsia, elective induction of labor, hypersensitivity to ergot preparations

Precautions: Severe renal/hepatic disease, jaundice, diabetes mellitus, seizure disorders, sepsis, CAD, last stage of labor

DOSAGE AND ROUTES

- **Adult: PO** 200 mcg tid-qid × ≤7 days; **IM/IV** 200 mcg q2-4hr × 1-5 doses

Available forms: Inj 200 mcg/ml; tabs 200 mcg

Administer:

PO route
- Do not exceed dosage limits
- Store tabs at room temperature
- Give with water
- Only during 4th stage of labor; not to be used to augment labor

IM route
- Protect from light
- IM in deep muscle mass; rotate inj sites for additional doses, aspirate

Direct IV route
- Undiluted through Y-tube or 3-way stopcock; give ≤0.2 mg/min or diluted in 5 ml 0.9% NaCl given through Y-site
- With crash cart available on unit; IV route used only in emergencies
- Refrigerated storage of ampules; protect from light; give only if solution is clear; colorless

Y-site compatibilities: Heparin, hydrocortisone sodium succinate, potassium chloride, vit B/C

SIDE EFFECTS

CNS: *Headache, dizziness,* seizures, hallucinations; stroke (IV)
CV: Hypotension, chest pain, palpitation, hypertension, dysrhythmias, CVA (IV)
EENT: Tinnitus
GI: *Nausea, vomiting*
GU: Cramping
INTEG: Sweating, rash, allergic reactions
MS: Leg cramps
RESP: Dyspnea

PHARMACOKINETICS

Metabolized in liver, excreted in urine
PO: Onset 5-25 min, duration 3 hr

IM: Onset 2-5 min, duration 3 hr
IV: Onset immediate, duration 45 min

INTERACTIONS

Increase: vasoconstriction—DOPamine, ergots, anesthetics (regional), vasopressors, nicotine
Increase: ergot toxicity—CYP3A4 inhibitors, do not use together

NURSING CONSIDERATIONS

Assess:
• B/P, pulse, character and amount of vaginal bleeding; watch for indications of hemorrhage
• Uterine relaxation; observe for severe cramping
⚠ **Ergot toxicity:** tinnitus, hypertension, palpitations, chest pain, nausea, vomiting, weakness; cold, numb extremities
Evaluate:
• Therapeutic response: absence of hemorrhage
Teach patient/family:
• To report increased blood loss, severe abdominal cramps, fever or foul-smelling lochia

methylnaltrexone (Rx)

(meth-il-nal-trex'one)
Relistor
Func. class.: Opioid antagonist

ACTION: Peripheral μ-opioid receptor antagonist that reduces constipation associated with opiate agonists

USES: Treatment of opioid-induced constipation in patients with advanced illness who are receiving palliative care when response to laxative therapy has been insufficient
Unlabeled uses: Pruritus; nausea, vomiting related to morphine; urinary retention from opioids

CONTRAINDICATIONS: Hypersensitivity, GI obstruction, IV route

Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, renal disease, diarrhea, driving, operating machinery, neoplastic disease, Crohn's disease, peptic ulcer, ulcerative colitis

DOSAGE AND ROUTES

Opiate-agonist–induced constipation
• **Adult >114 kg: SUBCUT** 0.15 mg/kg every other day prn
• **Adult 62-114 kg: SUBCUT** 12 mg every other day prn
• **Adult 38-<62 kg: SUBCUT** 8 mg every other day prn
• **Adult <38 kg: SUBCUT** 0.15 mg/kg every other day prn
Renal dose
• **Adult: SUBCUT** CCr <30 ml/min, reduce normal adult dose by 50%
Pruritus, nausea, and vomiting related to morphine (unlabeled) (oral dose investigational)
• **Adult: PO** 19.2 mg/kg 20 min prior to morphine
Available forms: Sol for inj 12 mg/0.6 ml
Administer:
• SUBCUT only; oral dose investigational, not currently available
• Do not give IV; IV dosing for urinary retention investigational
SUBCUT route
• Inspect sol before use; should be clear, colorless to pale yellow aqueous sol; do not use if particulate matter or discoloration are present
• Withdraw needed amount of sol into sterile syringe; if immediate administration is impossible, syringe may be kept at room temp for ≤24 hr; syringe does not need to be kept away from light during the 24-hr period; immediately discard any unused portion in vial; no preservatives are present
• Administer into upper arm, abdomen, or thigh ≤1×/24 hr; rotate inj sites; do not inject same spot each time; do not inject into areas where skin is tender,

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bruised, red, or hard; avoid areas with scars or stretch marks
• If using with retractable needle, slowly push down on plunger past resistance point until the syringe is empty and click is heard

SIDE EFFECTS

CNS: Dizziness
GI: Nausea, vomiting, diarrhea, flatulence, abdominal pain
INTEG: Hyperhidrosis

PHARMACOKINETICS

Terminal half-life 8 hr, protein binding 11%-15.3%; renal impairment has marked effect on renal excretion of methylnaltrexone; dose adjustment is required for patients with CCr <30 ml/min; renal clearance decreased and total systemic exposure increased in patients with severe renal impairment who receive single SUBCUT dose of 0.3 mg/kg
SUBCUT: Peak 30 min

NURSING CONSIDERATIONS

Assess:
• Serum creatinine
• **Opioid-induced constipation:** stool characteristics, bowel sounds during treatment
Perform/provide:
• Storage at 59° F-86° F (15° C-30° C); do not freeze
• Storage away from light
Evaluate:
• Therapeutic response: decreasing constipation
Teach patient/family:
• That, after 30 min, to remain near toilet facilities because bowel relaxation occurs, not to use more than 1 dose in 24 hr
• To notify prescriber of abdominal pain, continuous or severe diarrhea, nausea, vomiting
• Avoid use in pregnancy unless absolutely necessary; avoid in breastfeeding

methylphenidate (Rx)

(meth-ill-fen'i-date)
Biphentin ♣, Concerta, Daytrana, Metadate CD, Metadate ER, Methylin, Quillivant XR, Ritalin, Ritalin LA, Ritalin SR
Func. class.: Cerebral stimulant
Chem. class.: Piperidine derivative

Controlled Substance Schedule II

Do not confuse:
methylphenidate/methadone

ACTION: Increases release of norepinephrine, dopamine in cerebral cortex to reticular activating system; exact action not known

USES: Attention deficit disorder (ADD), attention-deficit/hyperactivity disorder (ADHD); narcolepsy (except Concerta, Metadate CD, Ritalin LA)

CONTRAINDICATIONS: Children <6 yr, hypersensitivity, anxiety, history of Gilles de la Tourette's syndrome; glaucoma, anorexia nervosa, tartrazine dye hypersensitivity
Precautions: Pregnancy (C), breastfeeding, hypertension, depression, seizures
Black Box Warning: Substance abuse

DOSAGE AND ROUTES

Attention-deficit/hyperactivity disorder (ADHD) initial treatment, not currently on methylphenidate
Regular release: Ritalin, Methylin, Methylin oral sol, Methylin chew tabs
• **Adult: PO** 20-30 mg/day, range 10-60 mg/day in 2-3 divided doses, 30-45 min before meals
• **Child ≥6 yr: PO** 5 mg bid initially, increase 5-10 mg/day weekly, usual dose 0.3-2 mg/kg/day, max 60 mg/day

Extended release: Ritalin SR, Metadate ER, Methylin ER

• **Adult/adolescent/child ≥6 yr: PO** max 20-30 mg tid

Extended-release once-daily tabs: Concerta

• **Adult: PO** 18-36 mg/day initially then adjust by 18 mg/wk, max 72 mg/day

• **Adolescent: PO** 18 mg/day initially then adjust by 18 mg/wk, max 72 mg/day

• **Child ≥6 yr: PO** 18 mg/day initially then adjust by 18 mg/wk, max 54 mg/day

Extended-release once-daily capsules: Ritalin LA

• **Adult/adolescent/child ≥6 yr: PO** 20 mg daily in AM initially, adjust by 10 mg/wk, max 60 mg/day

Extended-release once-daily capsules: Metadate CD

• **Adult/adolescent/child ≥6 yr: PO** 20 mg/day in AM, adjust by 20 mg/wk, max 60 mg/day

Transdermal: Daytrana

• **Adolescent/child ≥6 yr: TD** wk 1: 10 mg/day (9-mg patch); wk 2: 15 mg/day (9-mg patch); wk 3: 20 mg/day (9-mg patch); wk 4: 30 mg/day (9-mg patch)

Conversion to once-daily treatment from other forms for ADHD

Extended-release once-daily capsules: Metadate CD

• **Adult/adolescent/child ≥6 yr: PO** give no more than total daily dose of other forms, may adjust by 20 mg/wk, max 60 mg/day

Extended-release once-daily capsules: Ritalin LA

• **Adult/adolescent/child ≥6 yr: PO** give no more than total daily dose of other forms, may adjust by 10 mg/wk, max 60 mg/day

Extended-release once-daily tablets: Concerta

• **Adult/adolescent/child ≥6 yr (currently on 10-15 mg/day): PO** 18 mg every AM initially, adjust by 18 mg/wk, max 72 mg/day (adult); max 72 mg/day, 2 mg/kg/day (adolescent); 54 mg/day (child) mg/day

• **Adult/adolescent/child ≥6 yr (currently receiving 20-30 mg/day): PO** 36 mg every AM, adjust by 18 mg/wk, max 72 mg/day (adult); 72 mg/day, 2 mg/kg/day (adolescent); 54 mg/day (child)

• **Adult/adolescent/child ≥6 yr (currently receiving 30-45 mg/day): PO** 54 mg every AM, adjust by 18 mg/wk, max 72 mg/day (adult); 72 mg/day, 2 mg/kg/day (adolescent); 54 mg/day (child)

• **Adult/adolescent/child ≥6 yr (currently receiving 40-60 mg/day): PO** 72 mg every AM, 72 mg/day

Extended-release once-daily suspension: Quillivant XR

• **Adolescents/child ≥6 yr: PO** give in AM, increase in 10-20 mg increments q week

Narcolepsy

Immediate release: Ritalin, Methylin oral sol, Methylin chew tabs

• **Adult: PO** 20-30 mg/day, range 10-60 mg/day in 2-3 divided doses

• **Child ≥6 yr: PO** 5 mg bid, may increase by 5-10 mg/wk, max 60 mg/day

Extended-release tabs: Ritalin SR, Metadate ER

• **Adult/adolescent/child ≥6 yr: PO** max 20 mg tid

Poststroke depression; major depression (unlabeled)

• **Adult and geriatric: PO** (immediate rel tabs) 2.5 mg bid, may increase by 2.5-5 mg q2-3days

Available forms: Tabs 5, 10, 20 mg; ext rel tabs 10, 20, mg; ext rel tabs (Concerta) 18, 27, 36, 54 mg; ext rel caps 10, 20, 30, 40 mg; oral sol 5 mg, 10 mg/ml; chew tabs (Methylin) 2.5, 5, 10 mg; transdermal patch 12.5 cm^2 (10 mg), 18.75 cm^2 (15 mg), 25 cm^2 (20 mg), 37.5 cm^2 (30 mg); ext rel oral susp 300 mg/60 ml, 600 mg/120 ml, 750 mg/150 ml, 900 mg/180 ml

Administer:

PO route

• Do not crush, chew ext rel product; caps may be opened, beads sprinkled over spoonful of applesauce; give without regard to meals

• Gum, hard candy, frequent sips of water for dry mouth
• Give immediate rel dose 30-45 min before meals
• **Chew tab** with adequate water to prevent choking; contains phenylalanine
• Avoid metadate CD on day of surgery

Extended Release Oral Suspension (Quillivant XR)

• Shake bottle well, use calibrated dosing dispenser provided, give in AM without regard to meals, reconstitute as per manufacturer

Transdermal route

• Place on clean, dry area of hip; avoid waist; remove 9 hr after application; fold after removal, flush down toilet
• If patch falls off, apply new patch to different site; total wear time should be 9 hr

SIDE EFFECTS

CNS: *Hyperactivity, insomnia, restlessness, talkativeness,* dizziness, drowsiness, toxic psychosis, headache, akathisia, dyskinesia, masking or worsening of Tourette's syndrome, seizures, hallucinations, malignant neuroleptic syndrome, aggression; cerebral vasculitis, hemorrhage, stroke (rare)
CV: *Palpitations, tachycardia,* B/P changes, angina, dysrhythmias
ENDO: Growth retardation
GI: Nausea, anorexia, dry mouth, weight loss, abdominal pain
HEMA: Leukopenia, anemia, thrombocytopenic purpura
INTEG: Exfoliative dermatitis, urticaria, rash, erythema multiforme, hypersensitivity reactions
MISC: Fever, arthralgia, scalp hair loss

PHARMACOKINETICS

PO: Onset ½-1 hr, duration 4-6 hr, metabolized by liver, excreted by kidneys, half-life 3-4 hr

INTERACTIONS

• Hypertensive crisis: MAOIs or within 14 days of MAOIs, vasopressors

Increase: effects of tricyclics, SSRIs, anticonvulsants, SNRIs, CNS stimulants
Decrease: effect of antihypertensives

Drug/Herb

Increase: CNS stimulation—cola nut, guarana, horsetail, yerba maté, yohimbe

Drug/Food

Increase: stimulation—caffeine

NURSING CONSIDERATIONS

Assess:

• **ADHD:** attention span, decreased hyperactivity

Black Box Warning: Substance abuse: There is a high potential for abuse, use caution in those with history of substance abuse

• VS, B/P; may reverse antihypertensives; check patients with cardiac disease more often for increased B/P
• CBC with differential, platelets, LFTs, urinalysis; in diabetes: blood glucose, urine glucose; insulin changes may have to be made because eating will decrease
• Height, growth rate q3mo in children; growth rate may be decreased, but normal growth will resume when product is discontinued
• Mental status: mood, sensorium, affect, stimulation, insomnia, aggressiveness
⚠ **Withdrawal symptoms:** headache, nausea, vomiting, muscle pain, weakness, usually not associated with drug holidays
• Appetite, sleep, speech patterns
• **Narcolepsy:** identify frequency, length of narcoleptic episodes

Evaluate:

• Therapeutic response: decreased hyperactivity (ADHD); increased ability to stay awake (narcolepsy)

Teach patient/family:

• To decrease caffeine consumption (coffee, tea, cola, chocolate), may increase irritability, stimulation; not to use guarana, yerba maté, cola nut
• To avoid OTC preparations unless approved by prescriber
• To taper off product over several weeks because depression, increased sleeping, lethargy will occur

- To avoid driving, hazardous activities if dizziness, blurred vision occur
- To avoid alcohol
- To avoid hazardous activities until stabilized on medication
- To get needed rest; patients will feel more tired at end of day
- That shell of Concerta tab may appear in stools
- To take regular tab at least 6 hr prior to sleep, 10 hr for ext rel, use dosing syringe to measure liquid; do not use household teaspoon
- **Transdermal:** after tray is opened, use within 2 mo; do not store patches without protective patch, notify prescriber if skin irritation or rash occurs

TREATMENT OF OVERDOSE: Administer fluids; hemodialysis or peritoneal dialysis; antihypertensive for increased B/P; administer short-acting barbiturate before lavage

methylPREDNISolone (Rx)

(meth-il-pred-niss'oh-lone)

A-Methapred, Depo-Medrol, Medrol, Solu-Medrol

Func. class.: Corticosteroid, synthetic

Chem. class.: Glucocorticoid, immediate acting

Do not confuse:
methylPREDNISolone/predniSONE/medroxyPROGESTERone/methylTESTOSTERone

ACTION: Decreases inflammation by suppression of migration of polymorphonuclear leukocytes, fibroblasts; reversal of increased capillary permeability and lysosomal stabilization

USES: Severe inflammation, shock, adrenal insufficiency, collagen disorders, management of acute spinal cord injury, multiple sclerosis

Unlabeled uses: Multiple myeloma, bronchospasm prophylaxis, airway-obstructing hemangioma, noncardiogenic pulmonary edema, idiopathic pulmonary fibrosis, carpal tunnel syndrome, temporal arteritis, Churg-Strauss syndrome, mixed connective-tissue disease, polyarteritis nodosa, relapsing polychondritis, polymyalgia rheumatica, vasculitis, Wegener's granulomatosis, *Pneumocystis jiroveci* pneumonia in AIDS patients, acute spinal cord injury, severe acute respiratory syndrome (SARS), acute interstitial nephritis

CONTRAINDICATIONS: Hypersensitivity, intrathecal use, neonates

Precautions: Pregnancy (C), breastfeeding, diabetes mellitus, glaucoma, osteoporosis, seizure disorders, ulcerative colitis, CHF, myasthenia gravis, renal disease, esophagitis, peptic ulcer, tartrazine, benzyl alcohol, corticosteroid hypersensitivity, viral infection, TB, traumatic brain injury, Cushing's syndrome, measles, varicella, fungal infections

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DOSAGE AND ROUTES

Adrenal insufficiency/inflammation

- **Adult: PO** 4-48 mg in 4 divided doses; **IM** 10-80 mg (acetate); **IM/IV** 10-250 mg (succinate); **INTRAARTICULAR** 4-80 mg (acetate)
- **Child: IV** 0.5-1.7 mg/kg in 3-4 divided doses (succinate)

Multiple sclerosis

- **Adult: PO** 160 mg/day × 1 wk then 64 mg every other day × 30 days

Multiple myeloma/temporal arteritis/Churg-Strauss syndrome/mixed connective-tissue disease/polyarteritis nodosa/relapsing polychondritis/polymyalgia rheumatica/vasculitis/Wegener's granulomatosis (unlabeled)

- **Adult: PO** 4-48 mg/day in 4 divided doses; **IM** 10-120 mg (acetate); **IV** 10-40 mg over several min (sodium succinate)
- **Child: PO/IM** 0.5-1.7 mg/kg or 5-25 mg/m²/day in divided doses q6-12hr

Bronchospasm prophylaxis (unlabeled)

• **Adult and adolescent: PO/IV** 40-80 mg/day in 1-2 divided doses

• **Child: PO/IV** 1 mg/kg in 2 divided doses (max 60 mg)

Airway-obstructing hemangioma (unlabeled)

• **Child: PO** 0.5-1.7 mg/kg or 5-25 mg/m²/day in divided doses q6-12hr

Idiopathic pulmonary fibrosis (unlabeled)

• **Adult: IV** 1-2 g/wk or every other week

Carpal tunnel syndrome (unlabeled)

• **Adult: INJ** (local) 40-80 mg as a single inj

Available forms: Tabs 2, 4, 8, 16, 24, 32 mg; inj 20, 40, 80 mg/ml acetate; inj 40, 125, 500, 1000, 2000 mg/vial succinate

Administer:

• Titrated dose; use lowest effective dose

PO route

• With food or milk to decrease GI symptoms (PO)

• Once-a-day dose should be given in AM to coincide with body's normal cortisol secretion

IM route

• IM inj deep in large muscle mass; rotate sites; avoid deltoid; use 21G needle; after shaking suspension (parenteral); inj site reaction may occur (induration, pain at site, atrophy)

• In one dose in AM to prevent adrenal suppression; avoid SUBCUT administration; may damage tissue

⚠ Do not give Solu-Medrol intrathecally

IV route

• Use only Solu-Medrol, never use acetate product

Direct IV route

• Use only methylPREDNISolone sodium succinate (Solu-Medrol) IV, never use methylPREDNISolone acetate suspension IV

• After diluting with diluent provided; agitate slowly; give ≤500 mg/≥1 min directly over 3-15 min; doses ≥2 mg/kg or 250 mg should be given by intermittent IV infusion unless potential benefits outweigh risks

Intermittent/continuous INF route

• Dilute further in D5W, NS, D5NS; haze may form, give over 15-60 min; large dose (≥500 mg) should be given over 30-60 min

Syringe compatibilities: Granisetron, metoclopramide

Y-site compatibilities: Acyclovir, amifostine, amphotericin B cholesteryl, amrinone, aztreonam, cefepime, CISplatin, cladribine, cyclophosphamide, cytarabine, DOPamine, DOXOrubicin, enalaprilat, famotidine, fludarabine, granisetron, heparin, melphalan, meperidine, methotrexate, metroNIDAZOLE, midazolam, morphine, piperacillin/tazobactam, remifentanil, sodium bicarbonate, tacrolimus, teniposide, theophylline, thiotepa

SIDE EFFECTS

CNS: Depression, flushing, sweating, headache, mood changes

CV: Hypertension, circulatory collapse, thrombophlebitis, embolism, tachycardia

EENT: Fungal infections, increased intraocular pressure, blurred vision, cataracts

GI: Diarrhea, nausea, abdominal distention, GI hemorrhage, increased appetite, pancreatitis

HEMA: Thrombocytopenia

INTEG: Acne, poor wound healing, ecchymosis, petechiae

MS: Fractures, osteoporosis, weakness

PHARMACOKINETICS

Half-life >3½ hr (plasma), 18-36 hr (tissue); crosses placenta, enters breast milk in small amounts; metabolized in liver; excreted by kidneys (unchanged)

PO: Peak 1-2 hr, duration 1½ days, well absorbed

IM: Peak 4-8 days, duration 1-4 wk, well absorbed

Intraarticular: Peak 1 wk

INTERACTIONS

Increase: side effects—amphotericin B, diuretics

Increase: methylPREDNISolone action—oral contraceptives, estrogens

Increase: adrenal suppression—CYP3A4 inhibitors (aprepitant, antiretroviral protease inhibitors, clarithromycin, danazol, delavirdine, diltiazem, erythromycin, fluconazole, FLUoxetine, fluvoxaMINE, imatinib, ketoconazole, mibefradil, nefazodone, telithromycin, voriconazole)

Decrease: methylPREDNISolone effect—CYP3A4 inducers (barbiturates, bosentan, carBAMazepine, efavirenz, phenytoins, nevirapine, rifabutin, rifampin)

Decrease: effects of antidiabetics, vaccines, somatrem

Drug/Herb

• Avoid use with St. John's wort

Drug/Food

• Do not use with grapefruit juice; level of methylPREDNISolone will be increased

Drug/Lab Test

Increase: cholesterol, blood glucose

Decrease: Calcium, potassium, T_4, T_3, thyroid ^{131}I uptake test, urine 17-OHCS, 17-KS

False negative: skin allergy tests

NURSING CONSIDERATIONS

Assess:

• **Potassium depletion:** parethesias, fatigue, nausea, vomiting, depression, polyuria, dysrhythmias, weakness

• Edema, hypertension, cardiac symptoms

• Mental status: affect, mood, behavioral changes, aggression

• Potassium, blood glucose, urine glucose while receiving long-term therapy; hypokalemia and hyperglycemia

• Joint mobility, pain, edema if product given intraarticularly

• B/P q4hr, pulse; notify prescriber of chest pain, crackles

• I&O ratio; be alert for decreasing urinary output, increasing edema; weight daily; notify prescriber of weekly gain >5 lb

⚠ **Adrenal insufficiency:** weight loss, nausea, vomiting, confusion, anxiety, hypotension, weakness; plasma cortisol levels during long-term therapy (normal level: 138-635 nmol/L SI units when drawn at 8 AM)

• Growth in children receiving long-term treatment

• **Infection:** increased temp, WBC, even after withdrawal of product; product masks infection

Evaluate:

• Therapeutic response: ease of respirations, decreased inflammation; decreased symptoms of adrenal insufficiency

Teach patient/family:

• To increase intake of potassium, calcium, protein

• To carry emergency ID as corticosteroid user

• To notify prescriber if therapeutic response decreases; that dosage adjustment may be needed

⚠ Not to discontinue abruptly because adrenal crisis can result

• To take PO with food, milk to decrease GI symptoms

• To avoid OTC products: salicylates, alcohol in cough products, cold preparations unless directed by prescriber; to avoid vaccinations because immunosuppression occurs

• **Adrenal insufficiency:** nausea, anorexia, fatigue, dizziness, dyspnea, weakness, joint pain

• **Cushingoid symptoms:** buffalo hump, moon face, rapid weight gain, excess sweating

• **Infection:** to avoid persons with known infections; corticosteroids can mask symptoms of infection

metipranolol ophthalmic

See Appendix B

metoclopramide (Rx)

(met-oh-kloe-pra'mide)

Apo-Metoclop ✤, Metozolv ODT, Reglan

Func. class.: Cholinergic, antiemetic

Chem. class.: Central dopamine receptor antagonist

Do not confuse:
metoclopramide/metolazone
Reglan/Megace/Renagel

ACTION: Enhances response to acetylcholine of tissue in upper GI tract, which causes the contraction of gastric muscle; relaxes pyloric, duodenal segments; increases peristalsis without stimulating secretions; blocks dopamine in chemoreceptor trigger zone of CNS

USES: Prevention of nausea, vomiting induced by chemotherapy, radiation, delayed gastric emptying, gastroesophageal reflux

Unlabeled uses: Hiccups, migraines, breastfeeding induction, lung cancer

CONTRAINDICATIONS: Hypersensitivity to this product, procaine, or procainamide; seizure disorder, pheochromocytoma, breast cancer (prolactin dependent), GI obstruction

Precautions: Pregnancy (B), breastfeeding, GI hemorrhage, CHF, Parkinson's disease

Black Box Warning: Tardive dyskinesia

DOSAGE AND ROUTES

Nausea/vomiting (chemotherapy)

- **Adult: IV** 1-2 mg/kg 30 min before administration of chemotherapy, then q2hr × 2 doses, then q3hr × 3 doses
- **Child (unlabeled): IV** 1-2 mg/kg/dose

Facilitate small-bowel intubation for radiologic exams

- **Adult and child >14 yr: IV** 10 mg over 1-2 min
- **Child <6 yr: IV** 0.1 mg/kg
- **Child 6-14 yr: IV** 2.5-5 mg

Diabetic gastroparesis

- **Adult: PO** 10 mg 30 min before meals, at bedtime × 2-8 wk
- **Geriatric: PO** 5 mg 30 min before meals, at bedtime, increase to 10 mg if needed

Gastroesophageal reflux

- **Adult: PO** 10-15 mg qid 30 min before meals and at bedtime
- **Child: PO** 0.4-0.8 mg/kg/day in 4 divided doses

Renal dose

- **Adult:** CCr <40 ml/min 50% of dose

Lactation induction (unlabeled)

- **Adult: PO** 10 mg bid-tid, may increase to 20-45 mg/day in divided doses

Non–small-cell lung cancer (NSCLC) radiation sensitizer (unlabeled)

- **Adult: IV** (Sensamide IV) 2 mg/kg given 1 hr prior to radiation therapy 3×/wk

Hiccups (unlabeled)

- **Adult: PO/IM/IV** 10 mg q6hr

Available forms: Tabs 5, 10 mg; syr 5 mg/5 ml; inj 5 mg/ml; conc sol 10 mg/ml; orally disintegrating tab 5, 10 mg

Administer:

PO route

- ½-1 hr before meals for better absorption
- Gum, hard candy, frequent rinsing of mouth for dry oral cavity
- **Oral disintegrating:** place on tongue, allow to dissolve, swallow, remove from bottle immediately before use

IM route

- Give for post-operative nausea, vomiting prior to end of surgery

Direct IV route

- DiphenhydrAMINE IV or benztropine IM for EPS
- Undiluted if dose ≤10 mg; give over 2 min

Intermittent IV INF route

- >10 mg may be diluted in ≥50 ml D_5W, NaCl, Ringer's, LR, given over ≥15 min

Y-site compatibilities: Alfentanil, amifostine, amikacin, aminophylline, ascorbic acid, atracurium, atropine, azaTHIOprine, aztreonam, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, caspofungin, ceFAZolin, cefonicid, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, ceftAZidime, ceftizoxime, ceftRIAXone, cefuroxime, chloramphenicol, chlorproMAZINE, cimetidine, ciprofloxacin, cisatracurium, CISplatin, cladribine, clindamycin, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, dexmedetomidine, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, doripenem, doxapram, DOXOrubicin hydrochloride, doxycycline, droperidol, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, epoetin alfa, ertapenem, erythromycin, esmolol, etoposide, etoposide phosphate, famotidine, fenoldopam, fentaNYL, filgrastim, fluconazole, fludarabine, folic acid, foscarnet, gallium nitrate, gemcitabine, gentamicin, glycopyrrolate, granisetron, heparin, hydrocortisone, HYDROmorphone, IDArubicin, ifosfamide, imipenem/cilastatin, indomethacin, insulin, isoproterenol, ketorolac, labetalol, leucovorin, levofloxacin, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, melphalan, meperidine, meropenem, metaraminol, methadone, methotrexate, methoxamine, methyldopate, methylPREDNISolone, metoprolol, metroNIDAZOLE, miconazole, midazolam, milrinone, minocycline, mitoMYcin, morphine, moxalactam, multiple vitamins, nafcillin, nalbuphine, naloxone, nesiritide, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pantoprazole, papaverine, PEMEtrexed, penicillin G, pentamidine, pentazocine, PENTobarbital, PHENobarbital, phentolamine, phenylephrine, phytonadione, piperacillin/tazobactam, potassium chloride, procainamide, prochlorperazine, promethazine, propranolol, protamine, pyridoxine, quinupristin/dalfopristin, ranitidine, remifentanil, riTUXimab, rocuronium, sargramostim, sodium acetate/bicarbonate, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiamine, thiotepa, ticarcillin/clavulanate, tigecycline, tirofiban, tobramycin, tolazoline, topotecan, trastuzumab, trimethaphan, urokinase, vancomycin, vasopressin, vecuronium, verapamil, vinBLAStine, vinCRIStine, vinorelbine, voriconazole, zidovudine

SIDE EFFECTS

CNS: *Sedation, fatigue, restlessness, headache, sleeplessness, dystonia,* dizziness, drowsiness, **suicidal ideation, seizures,** EPS, **neuroleptic malignant syndrome; tardive dyskinesia (>3 mo, high doses)**

CV: Hypotension, supraventricular tachycardia

GI: Dry mouth, constipation, nausea, anorexia, vomiting, diarrhea

GU: Decreased libido, prolactin secretion, amenorrhea, galactorrhea

HEMA: **Neutropenia, leukopenia, agranulocytosis**

INTEG: Urticaria, rash

PHARMACOKINETICS

Metabolized by liver, excreted in urine, half-life 4 hr

PO: Onset ½-1 hr, duration 1-2 hr

IM: Onset 10-15 min, duration 1-2 hr

IV: Onset 1-3 min, duration 1-2 hr

INTERACTIONS

- Avoid use with MAOIs

Increase: sedation—alcohol, other CNS depressants

Increase: risk for EPS—haloperidol, phenothiazines

Decrease: action of metoclopramide—anticholinergics, opiates

Drug/Lab Test

Increase: prolactin, aldosterone, thyrotropin

M

NURSING CONSIDERATIONS

Assess:

Black Box Warning: EPS, tardive dyskinesia; more likely to occur in treatment >3 mo, geriatric patients and may be irreversible; assess for involuntary movements often

- **Neuroleptic malignant syndrome:** hyperthermia, change in B/P, pulse, tachycardia, sweating, rigidity, altered consciousness (rare)
- Mental status: depression, anxiety, irritability
- GI complaints: nausea, vomiting, anorexia, constipation

Perform/provide:

- Protect from light with aluminum foil during inf
- Discard open ampules

Evaluate:

- Therapeutic response: absence of nausea, vomiting, anorexia, fullness

Teach patient/family:

- To avoid driving, other hazardous activities until stabilized on product
- To avoid alcohol, other CNS depressants that will enhance sedating properties of this product

metolazone (Rx)

(me-tole'a-zone)

Zaroxolyn

Func. class.: Diuretic, antihypertensive

Chem. class.: Thiazide-like quinazoline derivative

Do not confuse:

metolazone/methotrexate/metoclopramide

ACTION: Acts on distal tubule by increasing excretion of water, sodium, chloride, potassium, magnesium, bicarbonate

USES: Edema, hypertension

Unlabeled uses: Heart failure, nephrotic syndrome

CONTRAINDICATIONS: Hypersensitivity to thiazides, sulfonamides; anuria, coma

Black Box Warning: Hepatic encephalopathy

Precautions: Pregnancy (B), breastfeeding, geriatric patients, hypokalemia, renal/hepatic disease, gout, COPD, lupus erythematosus, diabetes mellitus, hypotension, history of pancreatitis; hypersensitivity to sulfonamides, thiazides; electrolyte imbalance

DOSAGE AND ROUTES

Edema

- **Adult: PO** 5-10 mg/day; max 20 mg/day

Hypertension

- **Adult: PO** 2.5-5 mg/day

Available forms: Tabs 2.5, 5, 10 mg

Administer:

- In AM to avoid interference with sleep if using product as diuretic
- Potassium replacement if potassium <3 mg/dl
- With food if nausea occurs; absorption may be decreased slightly

SIDE EFFECTS

CNS: Anxiety, depression, *headache, dizziness, fatigue, weakness*

CV: Orthostatic hypotension, palpitations, volume depletion, hypotension, chest pain

EENT: Blurred vision

ELECT: *Hypokalemia,* hypercalcemia, hyponatremia

GI: *Nausea, vomiting, anorexia,* constipation, diarrhea, cramps, pancreatitis, GI irritation, dry mouth, jaundice

GU: *Urinary frequency,* polyuria, uremia, glucosuria, nocturia, impotence

HEMA: Aplastic anemia, hemolytic anemia, leukopenia, agranulocytosis, neutropenia

INTEG: *Rash,* urticaria, purpura, photosensitivity, fever, dry skin

META: *Hyperglycemia,* increased creatinine, BUN

MS: Muscle cramps, joint pain, swelling

PHARMACOKINETICS

Onset 1 hr, peak 2 hr, duration 12-24 hr, excreted unchanged by kidneys, crosses placenta, enters breast milk, half-life 14 hr

INTERACTIONS

Increase: hypokalemia—mezlocillin, piperacillin, amphotericin B, glucocorticoids, digoxin, stimulant laxatives
Increase: hypotension—alcohol (large amounts), nitrates, antihypertensives, barbiturates, opioids
Increase: toxicity—lithium
Increase: metolazone effects—loop diuretics
Decrease: action of metolazone—NSAIDs, salicylates

NURSING CONSIDERATIONS

Assess:
- Weight, I&O daily to determine fluid loss; effect of product may be decreased if used daily
- **CHF:** improvement in edema of feet, legs, sacral area daily if product being used
- **Hypertension:** B/P lying, standing; postural hypotension may occur
- Electrolytes: potassium, magnesium, sodium, chloride; include BUN, blood glucose, CBC, serum creatinine, blood pH, ABGs, uric acid, calcium
- **Hypokalemia:** postural hypotension, malaise, fatigue, tachycardia, leg cramps, weakness
- Rashes, fever daily
- Confusion, especially among geriatric patients; take safety precautions if needed

Black Box Warning: Hepatic encephalopathy: do not use in hepatic coma or precoma; fluctuations in electrolytes can occur rapidly and precipitate hepatic coma; use caution in patients with impaired hepatic function

Evaluate:
- Therapeutic response: decreased edema, B/P

Teach patient/family:
- To increase fluid intake to 2-3 L/day unless contraindicated; to rise slowly from lying or sitting position
- To notify prescriber of muscle weakness, cramps, nausea, dizziness
- That product may be taken with food or milk
- To use sunscreen for photosensitivity
- That blood glucose may be increased in diabetics
- To take early in day to avoid nocturia
- To avoid alcohol
- To avoid sodium foods, to increase potassium foods in diet

TREATMENT OF OVERDOSE:

Lavage if taken orally; monitor electrolytes; administer dextrose in saline; monitor hydration, CV, renal status

metoprolol (Rx)

(meh-toe'proe-lole)
Lopressor, Nu-Metop ✤, Toprol-XL
Func. class.: Antihypertensive, antianginal
Chem. class.: β_1-Blocker

Do not confuse:
metoprolol/misoprostol

ACTION:

Lowers B/P by β-blocking effects; reduces elevated renin plasma levels; blocks β_2-adrenergic receptors in bronchial, vascular smooth muscle only at high doses; negative chronotropic effect

USES:

Mild to moderate hypertension, acute MI to reduce cardiovascular mortality, angina pectoris, NYHA class II, III heart failure
Unlabeled uses: Migraine prevention, heart rate control for atrial fibrillation/flutter without accessory pathway, essential tremor, unstable angina

CONTRAINDICATIONS:

Hypersensitivity to β-blockers, cardiogenic shock, heart block (2nd, 3rd degree),

sinus bradycardia, pheochromocytoma, sick sinus syndrome

Precautions: Pregnancy (C), breast-feeding, geriatric patients, major surgery, diabetes mellitus, thyroid/renal/hepatic disease, COPD, CAD, nonallergic bronchospasm, CHF, bronchial asthma, CVA, children, depression, vasospastic angina

Black Box Warning: Abrupt discontinuation

DOSAGE AND ROUTES

Hypertension

- **Adult: PO** 50 mg bid or 100 mg/day; may give up to 200-450 mg in divided doses; **EXT REL** 25-100 mg daily, titrate at weekly intervals; max 400 mg/day
- **Geriatric: PO** 25 mg/day initially, increase weekly as needed
- **Child and adolescent 6-16 yr: PO ER** 1 mg/kg up to 50 mg daily

Myocardial infarction

- **Adult: IV BOL** (early treatment) 5 mg q2min × 3 then 50 mg **PO** 15 min after last dose and q6hr × 48 hr; (late treatment) **PO** maintenance 50-100 mg bid for 1-3 yr

Heart failure (NYHA class II/III)

- **Adult: PO EXT REL** 25 mg daily × 2 wk (class II); 12.5 mg daily (class III); **PO** (unlabeled) 5 mg bid, titrate to 100-150 mg/day in 2-3 divided doses

Angina

- **Adult: PO** 100 mg/day as a single dose or in 2 divided doses, increase weekly prn or 100 mg **EXT REL** daily, max 400 mg/day ext rel

Migraine prevention (unlabeled)

- **Adult: PO** 25-100 mg bid-qid; 50-200 mg daily (XL)

Heart rate control for atrial fibrillation/flutter without accessory pathway (unlabeled)

- **Adult: IV BOL** (acute setting) 2.5-5 mg over 2 min, may repeat dose × 3; **PO** (nonacute setting) 25-100 mg bid

Essential tremor (unlabeled)

- **Adult: PO** 50 mg/day, may increase, max 300 mg/day in divided doses; **EXT REL** 100 mg/day, max 400 mg/day

Available forms: Tabs 50, 100 mg; inj 1 mg/ml; ext rel tab (succinate) (XL) 25, 50, 100, 200 mg; ext rel tabs, tartrate 100 mg

Administer:

PO route

- Do not break, crush, or chew ext rel tabs
- Regular release tab after meals, at bedtime; tab may be crushed or swallowed whole; take at same time each day

Direct IV route

- IV, undiluted, give over 1 min × 3 doses at 2 to 5-min intervals; start **PO** 15 min after last IV dose

Y-site compatibilities: Abciximab, acyclovir, alemtuzumab, alfentanil, alteplase, amikacin, aminophylline, amiodarone, amphotericin B liposome, anidulafungin, argatroban, ascorbic acid, atracurium, atropine, azaTHIOprine, aztreonam, benztropine, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, caspofungin, ceFAZolin, cefonicid, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, cefTAZidime, ceftizoxime, cefTRIAXone, cefuroxime, chloramphenicol, chlorproMAZINE, cimetidine, CISplatin, clindamycin, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, dexmedetomidine, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, doxacurium, DOXOrubicin, doxycycline, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, epoetin alfa, eptifibatide, esmolol, etoposide, etoposide phosphate, famotidine, fenoldopam, fentaNYL, fluconazole, fludarabine, fluorouracil, folic acid, furosemide, ganciclovir, gemcitabine, gentamicin, glycopyrrolate, granisetron, heparin, hydrocortisone, HYDROmorphone, IDArubicin, ifosfamide, imipenem/cilastatin, indomethacin, insulin, isoproterenol, ketorolac, labetalol, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, meperidine, metaraminol, metho-

trexate, methoxamine, methyldopate, methylPREDNISolone, metoclopramide, metroNIDAZOLE, midazolam, milrinone, mitoXANtrone, morphine, multivitamins, nafcillin, nalbuphine, naloxone, nitroprusside, norepinephrine, octreotide, ondansetron, oxacillin, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pancuronium, papaverine, PEMEtrexed, penicillin G, pentamidine, pentazocine, PENTobarbital, PHENobarbital, phentolamine, phenylephrine, phytonadione, piperacillin/tazobactam, potassium chloride, procainamide, prochlorperazine, promethazine, propranolol, protamine, pyridoxime, quinupristin/dalfopristin, ranitidine, rocuronium, sodium bicarbonate, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiamine, thiotepa, ticarcillin/clavulanate, tigecycline, tirofiban, tobramycin, tolazoline, trimetaphan, urokinase, vancomycin, vasopressin, vecuronium, verapamil, vinCRIStine, vinorelbine, voriconazole

SIDE EFFECTS

CNS: *Insomnia, dizziness,* mental changes, hallucinations, depression, anxiety, headaches, nightmares, confusion, fatigue

CV: *Hypotension,* bradycardia, CHF, *palpitations,* dysrhythmias, cardiac arrest, AV block, pulmonary/peripheral edema, chest pain

EENT: Sore throat; dry, burning eyes

GI: *Nausea, vomiting,* colitis, cramps, *diarrhea,* constipation, flatulence, dry mouth, *biccups*

GU: Impotence

HEMA: Agranulocytosis, eosinophilia, thrombocytopenia, purpura

INTEG: Rash, purpura, alopecia, dry skin, urticaria, pruritus

RESP: Bronchospasm, dyspnea, wheezing

PHARMACOKINETICS

Half-life 3-4 hr, metabolized in liver (metabolites), excreted in urine, crosses placenta, enters breast milk

PO: Peak 2-4 hr, duration 13-19 hr

PO-ER: Peak 6-12 hr, duration 24 hr

IV: Onset immediate, peak 20 min, duration 6-8 hr

INTERACTIONS

- Do not use with MAOIs

Increase: hypotension, bradycardia—reserpine, hydrALAZINE, methyldopa, prazosin, amphetamines, EPINEPHrine, H_2-antagonists, calcium channel blockers

Increase: hypoglycemic effects—insulin, oral antidiabetics

Increase: metoprolol level—cimetidine

Increase: effects of benzodiazepines

Decrease: antihypertensive effect—salicylates, NSAIDs

Decrease: metoprolol level—barbiturates

Decrease: effects of—xanthines

Drug/Food

Increase: absorption with food

Drug/Lab Test

Increase: BUN, potassium, ANA titer, serum lipoprotein, triglycerides, uric acid, alk phos, LDH, AST, ALT

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Abrupt withdrawal: may cause MI, ventricular dysrhythmias, myocardial ischemia; taper dose over 7-14 days

- **Hypertension/angina:** ECG directly when giving IV during initial treatment
- I&O, weight daily; check for CHF (weight gain, jugular venous distention, crackles, edema, dyspnea)
- Monitor B/P during initial treatment, periodically thereafter; pulse q4hr; note rate, rhythm, quality; apical/radial pulse before administration; notify prescriber of any significant changes or pulse <60 bpm
- Baselines of renal, hepatic studies before therapy begins

Perform/provide:

- Storage in dry area at room temp; do not freeze

Evaluate:
- Therapeutic response: decreased B/P after 1-2 wk, decreased anginal pain

Teach patient/family:
- To take immediately after meals; to take medication at bedtime to prevent effect of orthostatic hypotension

Black Box Warning: Not to discontinue product abruptly; to taper over 2 wk; may cause angina

- Not to use OTC products containing α-adrenergic stimulants (nasal decongestants, OTC cold preparations) unless directed by prescriber; to avoid alcohol, smoking, sodium intake
- To report bradycardia, dizziness, confusion, depression, fever, sore throat, SOB, decreased vision to prescriber
- To take pulse, B/P at home; when to notify prescriber
- To comply with weight control, dietary adjustments, modified exercise program
- To carry emergency ID to identify product, allergies
- To monitor blood glucose closely if diabetic
- To avoid hazardous activities if dizziness is present
- To report symptoms of CHF: difficult breathing, especially on exertion or when lying down; night cough; swelling of extremities
- To wear support hose to minimize effects of orthostatic hypotension
- To report Raynaud's symptoms

TREATMENT OF OVERDOSE:

Lavage, IV atropine for bradycardia, IV theophylline for bronchospasm, digoxin, O_2, diuretic for cardiac failure, hemodialysis, administer vasopressor

metroNIDAZOLE (Rx)

(me-troe-ni'da-zole)

Flagyl, Flagyl ER, Flagyl IV, Flagyl IV RTU, Florazone ER ♣, Novo-Nidazol ♣

Func. class.: Antiinfective—miscellaneous

Chem. class.: Nitroimidazole derivative

ACTION:

Direct-acting amebicide/trichomonacide binds and disrupts DNA structure, thereby inhibiting bacterial nucleic acid synthesis

USES:

Intestinal amebiasis, amebic abscess, trichomoniasis, refractory trichomoniasis, bacterial anaerobic infections, giardiasis, septicemia, endocarditis; bone, joint, lower respiratory tract infections; rosacea

Unlabeled uses: Crohn's disease, urethritis, amebiasis due to *Dientamoeba fragilis, Entamoeba polecki*, giardiasis, pruritus; gastric ulcer, dyspepsia *(H. pylori)*, pseudomembranous colitis, guinea worm disease, periodontitis

CONTRAINDICATIONS:

Pregnancy 1st trimester, breastfeeding, hypersensitivity to this product

Precautions: Pregnancy (B) 2nd/3rd trimesters, geriatric patients, *Candida* infections, heart failure, fungal infection, dental disease, bone marrow suppression, hematologic disease, GI/renal/hepatic disease, contracted visual or color fields, blood dyscrasias, CNS disorders

Black Box Warning: Secondary malignancy

DOSAGE AND ROUTES

Trichomoniasis
- **Adult: PO** 500 mg bid × 7 days or 2 g as single dose; do not repeat treatment for 4-6 wk
- **Child (unlabeled): PO** 15 mg/kg/day in 3 divided doses × 7-10 days

• **Infant (unlabeled): PO** 10-30 mg/kg/day × 5-8 days

Refractory trichomoniasis

• **Adult: PO** 250 mg bid × 10 days

Amebic hepatic abscess

• **Adult: PO** 500-750 mg tid × 5-10 days

• **Child: PO** 35-50 mg/kg/day in 3 divided doses × 10 days

Intestinal amebiasis

• **Adult: PO** 750 mg tid × 5-10 days

• **Child: PO** 35-50 mg/kg/day in 3 divided doses × 10 days then oral iodoquinol

Anaerobic bacterial infections

• **Adult: IV INF** 15 mg/kg over 1 hr then 7.5 mg/kg **IV** or **PO** q6hr, not to exceed 4 g/day; 1st maintenance dose should be administered 6 hr after loading dose

Bacterial vaginosis

• **Adult: PO** regular rel 500 mg bid or 250 mg tid × 7 days; ext rel 750 mg/day × 7 days

Persistent urethritis (unlabeled)

• **Adult and adolescent: PO** 2 g as single dose with azithromycin

***Dientamoeba fragilis* (unlabeled)**

• **Child: PO** 250 mg tid × 7 days

***Entamoeba polecki* (unlabeled)**

• **Adult: PO** 750 mg tid × 10 days

• **Child: PO** 30-50 mg/kg/day in 3 divided doses × 5-10 days

Guinea worm disease (unlabeled)

• **Adult: PO** 250 mg tid × 10 days

• **Child: PO** 25 mg/kg/day in 3 divided doses × 10 days

Crohn's disease (unlabeled)

• **Adult: PO** 250 mg tid-qid

Giardiasis (unlabeled)

• **Adult: PO** 250 mg tid × 5-7 days

• **Child: PO** 15 mg/kg/day in 3 divided doses × 5 days

Antibiotic-associated pseudomembranous colitis (unlabeled)

• **Adult: PO** 500 mg 3-4×/day × 10-14 days; **IV** 500 mg q8hr

• **Child: PO/IV** 30 mg/kg/day (max 2 g) divided q6hr × 10 days

Available forms: Tabs 250, 500 mg; ext rel tab (ER) 750 mg; caps 375 mg; inj 500 mg/100 ml; powder for inj 500-mg single dose

Administer:

PO route

• Do not break, crush, or chew ext rel product

• PO with or after meals to avoid GI symptoms, metallic taste; crush tabs if needed

IV route

Intermittent INF ([Flagyl] IV RTU)

• Prediluted, ready to use; inf over 30-60 min

• Lyophilized vials: dilute with 4.4 ml sterile water, 0.9% NaCl; must be diluted further with ≥8 mg/ml 0.9% NaCl, D_5W, or LR; must neutralize with 5 mEq $NaCO_3$/500 mg; CO_2 gas will be generated and may require venting; run over ≥1 hr; primary IV must be discontinued; may be given as cont inf; do not use aluminum products; IV may require venting

• Do not use aluminum needles or other products to prepare product

Y-site compatibilities: Acyclovir, alemtuzumab, alfentanil, allopurinol, amifostine, amikacin, aminophylline, amiodarone, ampicillin, ampicillin/sulbactam, anidulafungin, atracurium, bivalirudin, bumetanide, buprenorphine, busulfan, butorphanol, calcium acetate/chloride/gluconate, CARBOplatin, ceFAZolin, cefepime, cefoperazone, cefotaxime, cefoTEtan, cefTRIAXone, cefuroxime, chloramphenicol, chlorproMAZINE, cimetidine, ciprofloxacin, cisatracurium, CISplatin, clindamycin, codeine, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, dexamethasone, dexmedetomidine, dexrazoxane, digoxin, diltiazem, dimenhyDRINATE, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, doripenem, doxacurium, doxapram, DOXOrubicin, DOXOrubicin liposome, doxycycline, droperidol, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, eptifibatide, ertapenem, erythromycin, esmolol, etoposide, etoposide phosphate, famotidine, fenoldopam, fentaNYL, fluconazole, fludarabine, fluo-

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rouracil, foscarnet, fosphenytoin, furosemide, gemcitabine, gentamicin, glycopyrrolate, granisetron, haloperidol, heparin, hydrALAZINE, hydrocortisone, HYDROmorphone, IDArubicin, ifosfamide, imipenem/cilastatin, inamrinone, insulin, isoproterenol, ketorolac, labetalol, leucovorin, levofloxacin, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, melphalan, meperidine, meropenem, mesna, metaraminol, methotrexate, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, midazolam, milrinone, mitoXANtrone, morphine, nafcillin, nalbuphine, naloxone, nesiritide, niCARdipine, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pancuronium, pentamidine, pentazocine, PENTobarbital, perphenazine, PHENobarbital, phentolamine, phenylephrine, piperacillin/tazobactam, potassium chloride/phosphates, prochlorperazine, promethazine, propranolol, ranitidine, remifentanil, riTUXimab, rocuronium, sargramostim, sodium acetate/bicarbonate/phosphates, streptozocin, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiopental, thiotepa, ticarcillin/clavulanate, tigecycline, tirofiban, tobramycin, trastuzumab, trimethobenzamide, trimethoprim/sulfamethoxazole, vancomycin, vasopressin, vecuronium, verapamil, vinCRIStine, vinorelbine, voriconazole, zidovudine, zoledronic acid

SIDE EFFECTS

CNS: *Headache, dizziness,* confusion, irritability, restlessness, ataxia, depression, fatigue, drowsiness, insomnia, paresthesia, peripheral neuropathy, seizures, incoordination, depression, encephalopathy, aseptic meningitis
CV: Flattening of T waves
EENT: Blurred vision, sore throat, retinal edema, dry mouth, metallic taste, furry tongue, glossitis, stomatitis, photophobia, optic neuritis
GI: *Nausea, vomiting, diarrhea,* epigastric distress, *anorexia,* constipation, *abdominal cramps,* pseudomembranous colitis
GU: Darkened urine, vaginal dryness, polyuria, albuminuria, dysuria, cystitis, decreased libido, nephrotoxicity, incontinence, dyspareunia, candidiasis
HEMA: Leukopenia, bone marrow, depression, aplasia, thrombocytopenia
INTEG: Rash, pruritus, urticaria, flushing, Stevens-Johnson syndrome

PHARMACOKINETICS

Crosses placenta, enters breast milk, metabolized by liver 30%-60%, excreted in urine (60%-80%), half-life 6-8 hr
PO: Peak 1-2 hr, absorbed 80%-85%
IV: Onset immediate, peak end of inf

INTERACTIONS

- Avoid use with zalcitabine, bortezomib, norfloxacin
- Do not use with amprenavir

Decrease: metroNIDAZOLE half-life—barbiturates
Decrease: metroNIDAZOLE—cholestyramine
Increase: disulfiram reaction—alcohol
Increase: busulfan toxicity—busulfan; avoid concurrent use
Increase: metroNIDAZOLE level—cimetidine
Increase: lithium, CYP3A4 substrates
Increase: action of warfarin, phenytoin, lithium, fosphenytoin
Increase: leukopenia—azaTHIOprine, fluorouracil

Drug/Lab Test
Altered: AST, ALT, LDH
Decrease: WBC, neutrophils
False decrease: triglycerides

NURSING CONSIDERATIONS

Assess:
- **Infection:** WBC, wound symptoms, fever, skin or vaginal secretions; start treatment after C&S; for opportunistic fungal infections; superinfection: fever, monilial growth, fatigue, malaise
- Stools during entire treatment; should be clear at end of therapy; stools should

be free of parasites for 1 yr before patient considered cured (amebiasis)
• Vision by ophthalmic exam during, after therapy; vision problems often occur
⚠ **Neurotoxicity:** peripheral neuropathy, seizures, dizziness, uncoordination, pruritus, joint pain; product may be discontinued
• **Allergic reaction:** fever, rash, itching, chills; product should be discontinued if these occur
• Renal, reproductive dysfunction: dysuria, polyuria, impotence, dyspareunia, decreased libido, I&O; weight daily

Black Box Warning: Secondary malignancy: use only when indicated; avoid unnecessary use

Perform/provide:
• Storage in light-resistant container; do not refrigerate

Evaluate:
• Therapeutic response: decreased symptoms of infection

Teach patient/family:
• That urine may turn dark reddish brown; that product may cause metallic taste
• About proper hygiene after bowel movement; handwashing technique
• To notify physician about numbness or tingling of extremities
• To avoid hazardous activities because dizziness can occur
• About need for compliance with dosage schedule, duration of treatment
• To use condoms if treatment for trichomoniasis or cross-contamination may occur; to notify prescriber if pregnant or planning to become pregnant; that treatment of both partners is necessary for trichomoniasis
• To use frequent sips of water, sugarless gum, candy for dry mouth
• Not to drink alcohol or use preparations containing alcohol during use or for 48 hr after use of product; disulfiram-like reaction can occur
• To notify if pregnancy is planned or suspected, pregnancy (B) 2nd/3rd trimester in trichomoniasis

metroNIDAZOLE (topical, vaginal)

(met-roe-ni'da-zole)

MetroCream, MetroGel, MetroGel Vaginal, MetroLotion, Noritate, Rosasol ✤, Rosadan, Vandazole

Func. class.: Antiprotozoal, antibacterial

Chem. class.: Nitroimidazole

ACTION: Antibacterial and antiprotozoal activity may result from interacting with DNA

USES: Acne rosacea, bacterial vaginosis

CONTRAINDICATIONS: Hypersensitivity to this product or nitroimidazoles, parabens

Precautions: Hepatic disease, blood dyscrasias; CNS conditions (vaginal), children

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DOSAGE AND ROUTES

Acne rosacea

• **Adult: TOP** apply to affected areas bid (0.75%) daily (1%); adjust therapy based on response

Bacterial vaginosis

• **Adult: VAG** 1 applicatorful bid × 5 days

Available forms: Topical cream 0.75%, 1%; gel 0.75%, 1%; lotion 0.75%; vaginal gel 0.75%

Administer:

Topical route

• Topical skin products are not for intravaginal therapy and are for external use only; do not use skin products near the eyes, nose, or mouth
• Wash hands before and after use; wash affected area and gently pat dry
• **Cream/Gel/Lotion:** Apply a thin film to the cleansed affected area; massage gently into affected areas

Intravaginal route

- Only use dosage formulations specified for intravaginal use; intravaginal dosage forms are not for topical therapy; do not ingest
- Avoid vaginal intercourse during treatment
- **Cream:** Use applicator(s) supplied by the manufacturer

SIDE EFFECTS

GU: Vaginitis, cervicitis; nausea, vomiting, cramping
INTEG: Redness, burning, dermatitis, rash, pruritus

INTERACTIONS

- MetroNIDAZOLE may increase warfarin anticoagulant effect
- Caution with drinking alcohol or using disulfiram while using metroNIDAZOLE products(vaginal gel)
- Possible lithium toxicity (vaginal gel)

NURSING CONSIDERATIONS

Assess:

- **Allergic reaction**: Assess for hypersensitivity, product may need to be discontinued
- **Infection**: Assess for number of lesions and severity of acne rosacea, itching in vaginosis

Evaluate:

- Decreased severity of acne rosacea, infection in vaginosis

Teach patient/family:

- That topical skin products are not for intravaginal therapy and are for external use only; not to use skin products near the eyes, nose, or mouth
- To wash hands before and after use; to wash affected area and gently pat dry
- **Cream/Gel/Lotion:** To apply a thin film to the cleansed affected area and massage gently into affected areas
- **Intravaginal Route:** To use only dosage formulations specified for intravaginal use; not to ingest intravaginal dosage forms because these are not for topical therapy; to avoid vaginal intercourse during treatment
- **Cream:** To use applicator(s) supplied by the manufacturer

micafungin (Rx)

(my-ca-fun'gin)

Mycamine

Func. class.: Antifungal, systemic

Chem. class.: Echinocandin

ACTION: Inhibits an essential component of fungal cell walls; causes direct damage to fungal cell wall

USES: Treatment of esophageal candidiasis; prophylaxis for *Candida* infections in patients undergoing hematopoietic stem-cell transplantation (HSCT); susceptible *Candida* sp.: *C. albicans, C. glabrata, C. krusei, C. parapsilosis, C. tropicalis*

Unlabeled uses: *Aspergillus* sp., pediatrics to prevent candidiasis, endocarditis, endophthalmitis, infectious arthritis, myocarditis, osteomyelitis, pericarditis, pneumonia, sinusitis, tracheobronchitis, prophylaxis of HIV-related esophageal candidiasis

CONTRAINDICATIONS: Hypersensitivity to this product or other echinocandins

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, severe hepatic disease, renal impairment

DOSAGE AND ROUTES

Esophageal candidiasis

- **Adult: IV INF** 150 mg/day given over 1 hr

Candidemia/acute disseminated candidiasis, abscess/peritonitis

- **Adult: IV** 100 mg/day over 1 hr

Prophylaxis for *Candida* infections

- **Adult: IV INF** 50 mg/day given over 1 hr
- **Adolescent/child/infant ≥6 mo (unlabeled): IV INF** 1 mg/kg/day, max 50 mg/day

***Aspergillus* sp. (unlabeled)**

• **Adult: IV INF** 25-150 mg/day × ≥30 days

Available forms: Powder for inj 50 mg, in single-dose vials 50-, 100-mg vial

Administer:

• Do not use if cloudy or precipitated; do not admix; by IV inf only

IV route

• Flush line before and after use with 0.9% NaCl

• **For *Candida* prevention,** reconstitute with provided dilutent 0.9% NaCl without bacteriostatic product; 50-mg vial/5 ml (10 mg/ml), swirl to dissolve, do not shake; further dilute with 100 ml 0.9% NaCl only; run over 1 hr

• **For *Candida* infection:** reconstitute with provided diluent 50 mg/5 ml (10 mg/ml); further dilute 3 reconstituted vials in 100 ml 0.9% NaCl, run over 1 hr

Y-site compatibilities: Aminophylline, bumetanide, calcium chloride/gluconate, cycloSPORINE, DOPamine, eptifibatide, esmolol, fenoldopam, furosemide, heparin, HYDROmorphone, lidocaine, LORazepam, magnesium sulfate, milrinone, nitroglycerin, nitroprusside, norepinephrine, phenylephrine, potassium chloride, potassium phosphate, tacrolimus, vasopressin

SIDE EFFECTS

CNS: Seizures, dizziness, *headache, somnolence,* fever, anxiety

CV: Flushing, hypertension, phlebitis, tachycardia

GI: Abdominal pain, *nausea, anorexia, vomiting, diarrhea, increased AST, ALT, alk phos, blood dehydrogenase, hyperbilirubinemia*

HEMA: Neutropenia, thrombocytopenia, leukopenia, coagulopathy, anemia, hemolytic anemia

INTEG: *Rash, pruritus, inj site pain*

META: Hypokalemia, hypocalcemia, hypomagnesemia

MS: *Rigors*

PHARMACOKINETICS

Metabolized in liver; excreted in feces, urine; terminal half-life 14-17.2 hr; protein binding 99%

INTERACTIONS

Increase: plasma concentrations—itraconazole, sirolimus, NIFEdipine; may need dosage reduction

NURSING CONSIDERATIONS

Assess:

• **Infection,** clearing of cultures during treatment; obtain culture at baseline and during treatment; product may be started as soon as culture is taken (esophageal candidiasis); monitor cultures during HSCT for prevention of *Candida* infections

• CBC (RBC, Hct, Hgb), differential, platelet count periodically; notify prescriber of results

• Renal studies: BUN, urine CCr, electrolytes before and during therapy

• Hepatic studies before and during treatment: bilirubin, AST, ALT, alk phos as needed

• **Bleeding:** hematuria, heme-positive stools, bruising, or petechiae, mucosa or orifices; blood dyscrasias can occur

• **For hypersensitivity:** rash, pruritus, facial swelling, phlebitis

• For hemolytic anemia

• **GI symptoms:** frequency of stools, cramping; if severe diarrhea occurs, electrolytes may need to be given

Perform/provide:

• Storage at room temp, away from light, do not freeze; discard unused sol

Evaluate:

• Therapeutic response: prevention of *Candida* infection with HSCT or decreased symptoms of *Candida* infection, negative culture

Teach patient/family:

• To notify prescriber if pregnancy is suspected or planned

• To avoid breastfeeding while taking this product

• To inform prescriber of kidney or liver disease

- To report bleeding, facial swelling, wheezing, difficulty breathing, itching, rash, hives, increasing warmth, flushing
- To report signs of infection: increased temp, sore throat, flulike symptoms
- To notify prescriber of nausea, vomiting, diarrhea, jaundice, anorexia, clay-colored stools, dark urine; heptatotoxicity may occur

miconazole

(mi-kon'a-zole)

Oravig

miconazole nitrate

Desenex, Femizol-M, Fungoid, Tincture, Lotrimin AF, Micatin, Micozole, Monistat-1, Monistat-3, Monistat-7, M-Zole 3, M-Zole 7, Tetterine, Ting, Vagistat-1, Zeasorb-AF

Func. class.: Antifungal

Chem. class.: Imidazole

Do not confuse: miconazole/clotrimazole/metroNIDAZOLE

ACTION: Antifungal activity results from disruption of cell membrane permeability

USES: Treatment of topical fungal infection, vulvovaginal candidiasis; athlete's foot (tinea pedis), jock itch (tinea cruris), and ringworm (tinea corporis)

CONTRAINDICATIONS: Hypersensitivity to this product or imidazoles; pregnancy first trimester(vaginal)
Precautions: Breastfeeding, children

DOSAGE AND ROUTES

Tinea corporis, cruris, pedis; cutaneous candidiasis

- **Adult/child >2 yr: TOP** apply bid × 2-4 wk

Tinea versicolor

- **Adult/child >2 yr: TOP** use × 2 wk, apply sparingly every day

Vulvovaginal candidiasis

- **Adult/child ≥12 yr: VAG** 1 applicatorful of Monistat-7 (100 mg) or 1 supp (100 mg) at bedtime × 7 days, repeat if needed, or Monistat-3 (200 mg) × 3 days or a 1200 mg supp × 1 day

Available forms: Topical cream, ointment, solution, lotion, powder, aerosol, powder 2%; aerosol spray 2%; vag cream 2, 4%; vag supp 100, 200, 1200 mg

Administer:

Topical route

- Topical skin products are not for intravaginal therapy and are for external use only; do not use skin products near the eyes, nose, or mouth
- Wash hands before and after use; wash affected area and gently pat dry
- **Cream/Ointment/Lotion/Solution:** Apply a thin film to the cleansed affected area; massage gently into affected areas
- **Solution Formulations:** Apply a thin film to the cleansed affected area; massage gently into affected areas; if using a solution-soaked pledget, patient may use more than 1 pledget per application as needed to treat affected areas, but each pledget should be used only once and then discarded
- **Intravaginal Route:** Only use dosage formulations specified for intravaginal use; intravaginal dosage forms are not for topical therapy; do not ingest
- **Suppository:** Unwrap vaginal ovule (suppository) before insertion; use applicator(s) supplied by the manufacturer
- **Cream:** Use applicator(s) supplied by the manufacturer

SIDE EFFECTS

CNS: Headache
GU: Pruritus, irritation, vaginal burning
INTEG: Burning, dermatitis, rash

NURSING CONSIDERATIONS

Assess:

Allergic reaction:

- Assess for hypersensitivity, product may need to be discontinued

Infection:
- Assess for severity of infection

Evaluate:
- Decreasing severity of infection

Teach patient/family:

Topical route
- That topical skin products are not for intravaginal therapy and are for external use only; not to use skin products near the eyes, nose, or mouth
- To wash hands before and after use; wash affected area and gently pat dry
- **Cream/Ointment/Lotion/Solution:** To apply a thin film to the cleansed affected area and massage gently into affected areas
- **Solution Formulations:** To shake well before use, apply a thin film to the cleansed affected area, and massage gently into affected areas

Intravaginal route
- To only use dosage formulations specified for intravaginal use; not to ingest intravaginal dosage forms
- **Suppository:** To unwrap vaginal ovule (suppository) before inserting; to use applicator(s) supplied by the manufacturer
- **Cream:** To use applicator(s) supplied by the manufacturer

midazolam (Rx)

(mid'ay-zoe-lam)

Func. class.: Sedative, hypnotic, antianxiety

Chem. class.: Benzodiazepine, short-acting

Controlled Substance Schedule IV

ACTION: Depresses subcortical levels in CNS; may act on limbic system, reticular formation; may potentiate γ-aminobutyric acid (GABA) by binding to specific benzodiazepine receptors

USES: Preoperative sedation, general anesthesia induction, sedation for diagnostic endoscopic procedures, intubation, anxiety

Unlabeled uses: Refractory status epilepticus, alcohol withdrawal

CONTRAINDICATIONS: Pregnancy (D), hypersensitivity to benzodiazepines, acute closed-angle glaucoma, status asthmaticus

Precautions: Breastfeeding, children, geriatric patients, COPD, CHF, chronic renal failure, chills, debilitated, hepatic disease, shock, coma, alcohol intoxication

Black Box Warning: Neonates (contains benzyl alcohol), IV administration, respiratory depression/insufficiency

DOSAGE AND ROUTES

Preoperative sedation
- **Adult and child ≥12 yr: IM** 0.07-0.08 mg/kg ½-1 hr before general anesthesia
- **Child 6 yr-11 yr: IV** 0.025-0.05 mg/kg; total dose of 0.4 mg/kg may be necessary
- **Child 6 mo-5 yr: IV** 0.05-0.1 mg/kg; total dose of 0.6 mg/kg may be necessary
- **Child 1-6 mo: IM** 0.1-0.15 mg/kg; may give up to 0.5 mg/kg if needed, max 10 mg

Induction of general anesthesia
- **Adult >55 yr:** (ASA I/II) **IV** 150-300 mcg/kg over 30 sec; (ASA III/IV) limit dose to 250 mcg/kg (nonpremedicated) or 150 mcg/kg (premedicated)
- **Adult <55 yr: IV** 200-350 mcg/kg over 20-30 sec; if patient has not received premedication, may repeat by giving 20% of original dose; if patient has received premedication, reduce dose by 50 mcg/kg
- **Child:** No safe and effective dose established; however, doses of 50-200 mcg/kg **IV** have been used

Continuous infusion for intubation (critical care)
- **Adult: IV** 0.01-0.05 mg/kg over several min; repeat at 10- to 15-min intervals until adequate sedation then 0.02-0.10 mg/kg/hr maintenance; adjust as needed

• **Child: IV** 0.05-0.2 mg/kg over 2-3 min then 0.06-0.12 mg/kg/hr by cont inf; adjust as needed
• **Neonate: IV** 0.03-0.06 mg/kg/hr, titrate using lowest dose

Status epilepticus (unlabeled)
• **Child and infant >2 mo: IV** 0.15 mg/kg then **CONT IV** 1 mcg/kg/min, titrate upward q5min until seizures controlled

Alcohol withdrawal (unlabeled)
• **Adult: IV** 1-5 mg q1-2hr (mild-moderate symptoms); **CONT IV INF** 1-20 mg q1-2hr (delirium tremens)

Available forms: Inj 1, 5 mg/ml, syr 2 mg/ml

Administer:

PO route
• Remove cap of press-in bottle adaptor, push adaptor into neck of bottle; close with cap; remove cap, insert tip of dispenser, insert into adaptor; turn upside-down, withdraw correct dose; place in mouth

IM route
• IM deep into large muscle mass

IV route
• May be given diluted or undiluted
• After diluting with D_5W or 0.9% NaCl to 0.25 mg/ml; give over 2 min (conscious sedation) or over 30 sec (anesthesia induction)

Y-site compatibilities: Abciximab, alfentamil, amikacin, amiodarone, argatroban, atracurium, atropine, aztreonam, benzotropine, calcium gluconate, ceFAZolin, cefotaxime, cefOXitine, ceftRIAXone, cimetidine, ciprofloxacin, CISplatin, clindamycin, cloNIDine, cyanocobalamin, cycloSPORINE, DACTINomycin, digoxin, diltiazem, diphenhydrAMINE, DOCEtaxal, DOPamine, doxycyclin, enalaprilat, EPINEPHrine, erythromycin, esmolol, etomidate, etoposide, famotidine, fentaNYL, fluconazole, folic acid, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, heparin, hetastarch, HYDROmorphone, hydrOXYzine, inamrinone, isoproterenol, labetalol, lactated Ringer's, levofloxacin, lidocaine, linezolid, LORazepam, magnesium, mannitol, meperdine, methadone, methyldopa, methylPREDNISolone, metoclopromide, metomolol, metroNIDAZOLE, milrinone, morphine, nalbuphine, naloxone, niCARdipine, nitroglycerin, nitroprusside, norepinephrine, ondansetron, oxacillin, oxytocin, PACLitaxel, palonasetron, pancuronium, papaverin, phytonadione, piperacillin, potassium chloride, propanolol, protamine, pyridoxine, ranitidine, remifentanil, sodium nitroprusside, succinylcholine, SUFentanil, teniposide, theophylline, thiotepa, ticarcillin, tobramycin, vancomycin, vasopressin, vecuronium, verapamil, voriconazole

SIDE EFFECTS

CNS: Retrograde amnesia, euphoria, confusion, headache, anxiety, insomnia, slurred speech, paresthesia, tremors, weakness, chills, agitation, paradoxic reactions
CV: Hypotension, PVCs, tachycardia, bigeminy, nodal rhythm, cardiac arrest
EENT: Blurred vision, nystagmus, diplopia, loss of balance
GI: *Nausea, vomiting,* increased salivation, hiccups
INTEG: Urticaria; pain, swelling, pruritus at inj site; rash
RESP: Coughing, apnea, bronchospasm, laryngospasm, dyspnea, respiratory depression

PHARMACOKINETICS

Protein binding 97%; half-life 1.8-6.4 hr, metabolized in liver; metabolites excreted in urine; crosses placenta, blood-brain barrier
PO: Onset 20-30 min
IM: Onset 15 min, peak $^1/_2$-1 hr, duration 2-3 hr
IV: Onset 3-5 min, onset of anesthesia $1^1/_2$-$2^1/_2$ min, duration 2 hr

INTERACTIONS

Increase: hypotension—antihypertensives, opiates, alcohol, nitrates

Increase: extended half-life—CYP3A4 inhibitors (cimetidine, erythromycin, ranitidine)
Increase: respiratory depression—other CNS depressants, alcohol, barbiturates, opiate analgesics, verapamil, ritonavir, indinavir, fluvoxaMINE
Decrease: midazolam metabolism—CYP3A4 inducers (azole antifungals, theophylline)
Drug/Herb
Increase: sedation—kava, valerian
Decrease: midazolam effect—St. John's wort
Drug/Food
Increase: (PO) midazolam effect—grapefruit juice

NURSING CONSIDERATIONS

Assess:
- B/P, pulse, respirations during IV; emergency equipment should be nearby
- Inj site for redness, pain, swelling
- Degree of amnesia in geriatric patients; may be increased
- Anterograde amnesia
- Vital signs for recovery period in obese patients; half-life may be extended

Black Box Warning: Respiratory depression insufficiency: apnea, respiratory depression that may be increased in geriatric patients

Perform/provide:
- Assistance with ambulation until drowsy period ends
- Storage at room temp; protect from light
- Immediate availability of resuscitation equipment, O_2 to support airway; do not give by rapid bolus

Evaluate:
- Therapeutic response: induction of sedation, general anesthesia

Teach patient/family:
- That amnesia occurs; that events may not be remembered

TREATMENT OF OVERDOSE:

Flumazenil, O_2

miglitol (Rx)

(mig'lih-tol)
Glyset
Func. class.: Oral hypoglycemic
Chem. class.: α-Glucosidase inhibitor

ACTION: Delays digestion and absorption of ingested carbohydrates, which results in a smaller rise in blood glucose after meals; does not increase insulin production

USES: Type 2 diabetes mellitus

CONTRAINDICATIONS: Hypersensitivity, diabetic ketoacidosis, cirrhosis, inflammatory bowel disease, colonic ulceration, partial intestinal obstruction, chronic intestinal disease, ileus
Precautions: Pregnancy (B), breastfeeding, children, renal/hepatic disease

DOSAGE AND ROUTES

- **Adult: PO** 25 mg tid initially, with 1st bite of meal; maintenance dose may be increased to 50 mg tid; may be increased to 100 mg tid if needed with dosage adjustment at 4- to 8-wk intervals

Available forms: Tabs 25, 50, 100 mg
Administer:
- Tid with first bite of each meal

SIDE EFFECTS

GI: *Abdominal pain, diarrhea, flatulence,* hepatotoxicity
HEMA: Low iron
INTEG: Rash
RESP: Pneumatosis cystoides, intestinalis

PHARMACOKINETICS

Peak 2-3 hr, not metabolized, excreted in urine as unchanged product, half-life 2 hr

INTERACTIONS

Decrease: levels of digoxin, propranolol, ranitidine

ecrease: miglitol levels—digestive enmes, intestinal adsorbents; do not use gether

rug/Food

crease: diarrhea—carbohydrates

IURSING CONSIDERATIONS

ssess:

Hypo/hyperglycemia; even though roduct does not cause hypoglycemia, if atient receiving sulfonylureas or insulin, ypoglycemia may be additive (rare)

Blood glucose levels, hemoglobin, A1c FTs; if hypoglycemia occurs with monoierapy, treat with glucose

erform/provide:

Storage in tight container at room emp

valuate:

Therapeutic response: decreased igns, symptoms of diabetes mellitus polyuria, polydipsia, polyphagia; clear ensorium, absence of dizziness; stable gait); improved blood glucose, A1c

Teach patient/family:

- About the symptoms of hypo/hyperglycemia, what to do about each; that, during periods of stress, infection, or surgery, insulin may be required
- That medication must be taken as prescribed; about consequences of discontinuing medication abruptly
- To avoid OTC medications unless approved by health care provider
- That diabetes is lifelong; that product is not a cure
- To carry ID for emergency purposes
- That diet and exercise regimen must be followed
- About GI side effects

⚠ HIGH ALERT

milrinone (Rx)

(mill'rih-nohn)

Func. class.: Inotropic/vasodilator agent with phosphodiesterase activity

Chem. class.: Bipyridine derivative

ACTION: Positive inotropic agent; increases contractility of cardiac muscle with vasodilator properties; reduces preload and afterload by direct relaxation on vascular smooth muscle

USES: Short-term management of advanced heart failure that has not responded to other medication

Unlabeled uses: Adolescents, children, infants

CONTRAINDICATIONS: Hypersensitivity to this product, severe aortic disease, severe pulmonic valvular disease, acute MI

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, renal/hepatic disease, atrial flutter/fibrillation

DOSAGE AND ROUTES

- **Adult: IV BOL** 50 mcg/kg given over 10 min; start inf of 0.375-0.75 mcg/kg/min
- **Adolescent/child/infant (unlabeled): IV** 50-75 mcg/kg over 10-60 min then 0.5-0.75 mcg/kg/min

Renal dose

- **Adult: IV** CCr 41-50 ml/min, 0.43 mcg/kg/min, titrate up; CCr 31-40 ml/min, 0.38 mcg/kg/min, titrate up; CCr 21-30 ml/min, 0.33 mcg/kg/min, titrate up; CCr 11-20 ml/min, 0.08 mcg/kg/min; CCr 6-10 ml/min, 0.23 mcg/kg/min; CCr ≤5 ml/min, 0.20 mcg/kg/min; max for all doses 0.75 mcg/kg/min

Available forms: Inj 1 mg/ml; premixed inj 200 mcg/ml in D_5W

Administer:

- Potassium supplements if ordered for potassium levels <3 mg/dl

Direct IV route

- Give IV loading dose undiluted over 10 min, use inf device

Continuous IV route

- Dilute 20-mg vial with 80, 113, 180 ml of 0.45% NaCl, 0.9% NaCl, or D_5W to a conc of 200, 150, 100 mcg/ml respectively
- Titrate rate based on hemodynamic and clinical response, use inf device
- Precipitation will form when furosemide is injected into line with milrinone

Y-site compatibilities: Acyclovir, alfentanil, allopurinol, amifostine, amikacin, aminocaproic acid, aminophylline, amiodarone, amphotericin B liposome, ampicillin, ampicillin-sulbactam, anidulafungin, argatroban, atenolol, atracurium, aztreonam, bivalirudin, bleomycin, bumetanide, buprenorphine, busulfan, butorphanol, calcium chloride/gluconate, CARBOplatin, caspofungin, ceFAZolin, cefepime, cefotaxime, cefoTEtan, cefOXitin, cefTAZidime, ceftizoxime, cefTRIAXone, cefuroxime, chloramphenicol, chlorproMAZINE, cimetidine, ciprofloxacin, cisatracurium, CISplatin, clindamycin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, digoxin, diltiazem, DOBUTamine, DOCEtaxel, DOPamine, doripenem, doxacurium, DOXOrubicin, doxycycline, droperidol, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, eptifibatide, ertapenem, erythromycin, etoposide, famotidine, fenoldopam, fentaNYL, fluconazole, fludarabine, fluorouracil, gallium, ganciclovir, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, haloperidol, heparin, hydrALAZINE, hydrocortisone, HYDROmorphone, IDArubicin, ifosfamide, insulin (regular), irinotecan, isoproterenol, ketorolac, labetalol, levofloxacin, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, melphalan, meperidine, meropenem, methohexital, methotrexate, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, micafungin, midazolam, mitoXANtrone, morphine, mycophenolate, nafcillin, nalbuphine, naloxone, nesiritide, niCARdipine, nitroglycerin, nitroprusside, norepinephrine, octreotide, oxacillin, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pamidronate, pancuronium, PEMEtrexed, pentamidine, pentazocine, PENTobarbital, PHENobarbital, phenylephrine, piperacillin, piperacillin-tazobactam, polymyxin B, potassium chloride/phosphates, prochlorperazine, promethazine, propofol, propranolol, quiNIDine, quinupristin-dalfopristin, ranitidine, remifentanil, rocuronium, sodium acetate/bicarbonate/phosphates, streptozocin, succinylcholine, SUFentanil, sulfamethoxazole-trimethoprim, tacrolimus, teniposide, theophylline, thiopental, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, tobramycin, torsemide, vancomycin, vasopressin, vecuronium, verapamil, vinCRIStine, vinorelbine, voriconazole, zidovudine, zoledronic acid

SIDE EFFECTS

CV: Dysrhythmias, hypotension, chest pain, *PVCs*

GI: Nausea, vomiting, anorexia, abdominal pain, hepatotoxicity, jaundice

HEMA: Thrombocytopenia

MISC: Headache, hypokalemia, tremor, inj site reactions

PHARMACOKINETICS

IV: Onset 2-5 min, peak 10 min, duration variable; terminal half-life 2.3 hr; metabolized in liver; excreted in urine as product (83%), metabolites (12%)

INTERACTIONS

Increase: effects of antihypertensives, diuretics

NURSING CONSIDERATIONS

Assess:

⚠ ECG continuously during IV; ventricular dysrhythmia can occur

• B/P, pulse q5min during inf; if B/P drops 30 mm Hg, stop inf, call prescriber
• Electrolytes: potassium, sodium, chloride, calcium; renal studies: BUN, creatinine; blood studies: platelet count
• ALT, AST, bilirubin daily
• I&O ratio, weight daily; diuresis should increase with continuing therapy
• If platelets are $<150{,}000/mm^3$, product is usually discontinued and another product started

Evaluate:
• Therapeutic response: increased cardiac output, decreased PCWP, adequate CVP; decreased dyspnea, fatigue, edema, ECG

Teach patient/family:
• To report angina immediately during inf
• To report headache, which can be treated with analgesics

TREATMENT OF OVERDOSE:
Discontinue product, support circulation

minocycline (Rx)
(min-oh-sye'kleen)
Arestin, Dynacin, Minocin, Solodyn
Func. class.: Broad-spectrum antiinfective
Chem. class.: Tetracycline

ACTION:
Inhibits protein synthesis, phosphorylation in microorganisms by binding to ribosomal subunits, reversibly binding to ribosomal subunits; bacteriostatic

USES:
Syphilis, *Chlamydia trachomatis,* gonorrhea, lymphogranuloma venereum, rickettsial infections, inflammatory acne, *Neisseria meningitidis, Neisseria gonorrhoeae, Treponema pallidum, Chlamydia trachomatis, Ureaplasma urealyticum, Mycoplasma pneumoniae, Nocardia,* periodontitis, methicillin-resistant *S. aureus* (MRSA) infection, nonnodular moderate to severe acne vulgaris, *Rickettsia* sp.
Unlabeled uses: Rheumatoid arthritis, bullous pemphigoid, dental infection, prostatis, pleural effusion

CONTRAINDICATIONS:
Pregnancy (D), children <8 yr, hypersensitivity to tetracyclines
Precautions: Hepatic disease, breastfeeding

DOSAGE AND ROUTES
• **Adult: PO/IV** 200 mg then 100 mg q12hr, max 400 mg/24 hr **IV; SUBGINGIVAL** inserted into periodontal pocket
• **Child >8 yr: PO/IV** 4 mg/kg then 4 mg/kg/day **PO** in divided doses q12hr

Rickettsial infections
• **Adult: PO/IV** 200 mg, then 100 mg q12hr
• **Child ≥8 yr/adolescent: PO/IV** 4 mg/kg, then 2 mg/kg q12hr, max adult dose

Gonorrhea
• **Adult: PO** 200 mg then 100 mg q12hr × ≥4 days

Chlamydia trachomatis
• **Adult: PO** 100 mg bid × 7 days

Syphilis
• **Adult: PO** 200 mg then 100 mg q12hr × 10-15 days

Uncomplicated gonococcal urethritis in men
• **Adult: PO** 100 mg q12hr × 5 days

Acne vulgaris (Solodyn only)
• **Adult/adolescent/child ≥12 yr:** ext rel 1 mg/kg/day × 12 wk or those weighing 126-136 kg—135 mg/day; 111-125 kg—115 mg/day; 97-110 kg—105 mg/day; 85-96 kg—90 mg/day; 72-84 kg—80 mg/day; 60-71 kg—65 mg/day; 50-59 kg—55 mg/day; 45-49 kg—45 mg/day

Acne vulgaris (all except Solodyn)
• **Adult/adolescent/child ≥12 yr:** ext rel 1 mg/kg × 12 wk or 91-136 kg, 135 mg/day; 60-90 kg, 90 mg/day; 45-59 kg, 45 mg/day

Rheumatoid arthritis (unlabeled)
• **Adult: PO** 100 mg bid for ≤48 wk

Bullous pemphigus (unlabeled)
• **Adult: PO** 50 mg/day; may increase to 100 mg/day after 1-2 wk
Available forms: Caps 50, 75, 100 mg; powder for inj 100 mg; caps, pellet filled 50, 100 mg; tabs 50, 75, 100 mg; ext rel tabs 45, 55, 65, 80, 90, 105, 115, 135 mg
Administer:
• After C&S obtained
PO route
• With full glass of water; with food for GI symptoms
• 2 hr before or after laxative or ferrous products; 3 hr after antacid
IV route
• After diluting 100 mg/5 ml sterile water for inj; further dilute in 500-1000 ml of NaCl, dextrose sol, LR, Ringer's sol; run 100 mg/6 hr

Y-site compatibilities: Alfentanil, amikacin, atracurium, benztropine, buprenorphine, butorphanol, calcium chloride, CARBOplatin, caspofungin, cefonicid, chlorpromazine, cimetidine, cisatracurium, codeine, cyclophosphamide, cyclOSPORINE, cytarabine, DACTINomycin, dexmedetomidine, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, doxacurium, doxycycline, enalaprilat, ePHEDrine, EPINEPHrine, eptifibatide, etoposide, fenoldopam, fentaNYL, filgrastim, fludarabine, gatafloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, heparin, hetastarch, IDArubicin, ifosfamide, inamrinone, isoproterenol, labetalol, levofloxacin, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, melphalan, metaraminol, methotrexate, methyldopa, metoclopramide, metoprolol, midazolam, mitoXANtrone, nalbuphine, naloxone, perphenazine, potassium chloride, remifentanil, sargramostim, teniposide, vinorelbine, vit B/C

SIDE EFFECTS

CNS: *Dizziness*, fever, lightheadedness, vertigo, seizures, increased intracranial pressure
CV: Pericarditis
EENT: Dysphagia, glossitis, decreased calcification of deciduous teeth, permanent discoloration of teeth, oral candidiasis
GI: *Nausea*, abdominal pain, *vomiting, diarrhea*, anorexia, enterocolitis, hepatotoxicity, flatulence, abdominal cramps, epigastric burning, stomatitis, pseudomembranous colitis
GU: *Increased BUN*, polyuria, polydipsia, renal failure, nephrotoxicity
HEMA: Eosinophilia, neutropenia, thrombocytopenia, hemolytic anemia, pancytopenia
INTEG: *Rash, urticaria, photosensitivity, increased pigmentation*, exfoliative dermatitis, pruritus, blue-gray color of skin, mucous membranes
MS: Myalgia, arthritis, bone discoloration, joint stiffness
SYST: Angioedema, Stevens-Johnson syndrome

PHARMACOKINETICS

PO: Peak 1-4 hr, half-life 11-22 hr; excreted in urine, feces, breast milk; crosses placenta; 70%-75% protein bound

INTERACTIONS

Increase: effect of warfarin, digoxin, insulin, oral anticoagulants, theophylline, neuromuscular blockers
Increase: chance of pseudomotor cerebri—retinoids; do not use concurrently
Decrease: effect of minocycline—antacids, sodium bicarbonate, alkali products, iron, kaolin/pectin, cimetidine, quinapril, sucralfate
Decrease: effect of barbiturates, carBAMazepine, phenytoin, penicillins, oral contraceptives, calcium
Drug/Lab Test
False negative: urine glucose with Clinistix or Tes-Tape

NURSING CONSIDERATIONS

Assess:
⚠ **Pseudomembranous colitis:** diarrhea, abdominal cramps, fever; may start up to 2 mo after treatment ends
• I&O ratio

- Age and tooth development
- Blood tests: PT, CBC, AST, ALT, BUN, creatinine
- Signs of anemia: Hct, Hgb, fatigue

Allergic reactions: rash, itching, pruritus, angioedema

- Nausea, vomiting, diarrhea; administer antiemetic, antacids as ordered

Overgrowth of infection: fever, malaise, redness, pain, swelling, drainage, perineal itching, diarrhea; changes in cough or sputum; black, furry tongue

Perform/provide:

- Storage in airtight, light-resistant container at room temp

Evaluate:

- Therapeutic response: decreased temp, absence of lesions, negative C&S

Teach patient/family:

- To avoid sunlight, wear protective clothing; sunscreen does not seem to decrease photosensitivity
- That all prescribed medication must be taken to prevent superinfection; not to use outdated product because Fanconi's syndrome may occur
- To avoid taking antacids, iron, cimetidine; use 2 hr before, 6 hr after this product; absorption may be decreased
- That teeth discoloration, joint or muscle pain may occur

minoxidil (Rx, OTC)

(mi-nox'i-dill)

Loniten, Rogaine (topical)

Func. class.: Antihypertensive

Chem. class.: Vasodilator, peripheral

Do not confuse:
minoxidil/Monopril
Loniten/Lipitor

ACTION: Directly relaxes arteriolar smooth muscle, causing vasodilation; reduces peripheral vascular resistance, decreases B/P

USES: Severe hypertension unresponsive to other therapy (use with diuretic and β-blocker); topically to treat alopecia

Unlabeled uses: Scleroderma renal crisis (SRC) to control hypertension

CONTRAINDICATIONS: Dissecting aortic aneurysm, hypersensitivity, pheochromocytoma

Black Box Warning: Acute MI

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, renal disease, CVD

Black Box Warning: CAD, CHF, cardiac disease, cardiac tamponade, edema, hypotension, orthostatic hypotension, pericardial effusion

DOSAGE AND ROUTES

Severe hypertension

- **Adult: PO** 2.5-5 mg/day in 1-2 divided doses; max 100 mg/day; usual range 10-40 mg/day in single dose
- **Geriatric: PO** 2.5 mg/day, may be increased gradually
- **Child <12 yr: PO** (initial) 0.1-0.2 mg/kg/day; (effective range) 0.25-1 mg/kg/day; (max) 50 mg/day

Alopecia

- **Adult: TOP** 1 ml bid, rub into scalp daily, max 2 ml/day

Scleroderma renal crisis (unlabeled)

- **Adult: PO** 5 mg/day in 1-2 divided doses, increase after 3 days by 10-20 mg/day to reach desired B/P, max 100 mg/day

Available forms: Tabs 2.5, 10 mg; topical 2%, 5% sol; topical foam 5%

Administer:

PO route

- With meals for better absorption, to decrease GI symptoms
- With β-blocker and/or diuretic for hypertension

Topical route

- 1 ml no matter how much balding has occurred; increasing dosage does not speed growth

SIDE EFFECTS

Systemic

CNS: Headache, fatigue

CV: *Severe rebound hypertension on withdrawal in children,* tachycardia, angina, increased T wave, CHF, pulmonary edema, pericardial effusion, edema, sodium, water retention, hypotension

GI: Nausea, vomiting

GU: Breast tenderness

HEMA: Hct, Hgb; erythrocyte count may decrease initially

INTEG: Pruritus, Stevens-Johnson syndrome, rash, hirsutism

PHARMACOKINETICS

PO: Onset 30 min, peak 2-3 hr, duration 48-120 hr; half-life 4.2 hr; metabolized in liver; metabolites excreted in urine, feces; protein binding minimal

INTERACTIONS

Increase: hypotension—antihypertensives, MAOIs

Decrease: antihypertensive effect—NSAIDs, salicylates, estrogens

Drug/Herb

Increase: antihypertensive effect—hawthorn

Drug/Lab Test

Increase: renal studies

Decrease: Hgb/Hct/RBC

NURSING CONSIDERATIONS

Assess:

⚠ Monitor closely; usually given with β-blocker to prevent tachycardia and increased myocardial workload; usually given with diuretic to prevent serious fluid accumulation; patient should be hospitalized during beginning treatment

- Nausea, edema in feet, legs daily
- Skin turgor, dryness of mucous membranes for hydration status
- Crackles, dyspnea, orthopnea
- Electrolytes: potassium, sodium, chloride, CO_2
- Renal studies: catecholamines, BUN, creatinine
- Hepatic studies: AST, ALT, alk phos
- B/P, pulse
- Weight daily, I&O

Perform/provide:

- Storage protected from light and heat

Evaluate:

- Therapeutic response: decreased B/P, increased hair growth

Teach patient/family:

- That body hair will increase but is reversible after discontinuing treatment
- Not to discontinue product abruptly
- To report pitting edema, dizziness, weight gain >5 lb, SOB, bruising or bleeding, heart rate >20 beats/min over normal, severe indigestion, dizziness, lightheadedness, panting, new or aggravated symptoms of angina
- To take product exactly as prescribed because serious side effects may occur

Topical

- That for topical use, treatment must continue for the long term, or new hair will be lost
- Not to use except on scalp

TREATMENT OF OVERDOSE:

Administer normal saline IV, vasopressors

mirtazapine (Rx)

(mer-ta'za-peen)

Remeron, Remeron Soltab

Func. class.: Antidepressant

Chem. class.: Tetracyclic

ACTION: Blocks reuptake of norepinephrine and serotonin into nerve endings, thereby increasing action of norepinephrine and serotonin in nerve cells; antagonist of central α_2-receptors; blocks histamine receptors

USES: Depression; dysthymic disorder; bipolar disorder: depressed, agitated depression

Unlabeled uses: Resting tremor, benign familial tremor, levodopa-induced dyskinesias, pruritus

CONTRAINDICATIONS:

Hypersensitivity to tricyclics, recovery phase of MI, agranulocytosis, jaundice

Precautions: Pregnancy (C), geriatric patients, suicidal patients, severe depression, increased intraocular pressure, closed-angle glaucoma, urinary retention, cardiac/renal/hepatic disease, hypo/hyperthyroidism, electroshock therapy, elective surgery, seizure disorder, bone marrow suppression, thrombocytopenia

Black Box Warning: Suicidal ideation, children

DOSAGE AND ROUTES

• **Adult: PO** 15 mg/day at bedtime, maintenance to continue for 6 mo, titrate up to 45 mg/day; **ORALLY DISINTEGRATING** tabs: open blister pack, place tab on tongue, allow to disintegrate, swallow

• **Geriatric: PO** 7.5 mg at bedtime, increase by 7.5 mg q1-2wk to desired dose, max 45 mg/day

Resting tremor/benign familial tremor/levodopa-induced dyskinesias (unlabeled)

• **Adult: PO** titrate up to 30 mg at bedtime

Pruritus (unlabeled)

• **Adult: PO** 15-30 mg/day

Available forms: Tabs 7.5, 15, 30, 45 mg; orally disintegrating tab (Soltab) 15, 30, 45 mg

Administer:

• Increased fluids, bulk in diet for constipation, especially for geriatric patients

• With food, milk for GI symptoms

• Dosage at bedtime if oversedation occurs during day; may take entire dose at bedtime; geriatric patients may not tolerate once daily dosing

• Gum, hard candy, or frequent sips of water for dry mouth

• **Orally disintegrating tab:** no water needed; allow to dissolve on tongue, do not split

SIDE EFFECTS

CNS: *Dizziness, drowsiness,* confusion, headache, anxiety, tremors, stimulation, weakness, nightmares, EPS (geriatric patients), increased psychiatric symptoms, seizures

CV: *Orthostatic hypotension, ECG changes, tachycardia,* hypertension, palpitations

EENT: *Blurred vision,* tinnitus, mydriasis

GI: *Diarrhea, dry mouth,* nausea, vomiting, paralytic ileus, increased appetite, cramps, epigastric distress, constipation, jaundice, hepatitis, stomatitis, weight gain

GU: *Urinary retention,* acute renal failure

HEMA: Agranulocytosis, thrombocytopenia, eosinophilia, leukopenia

INTEG: Rash, urticaria, sweating, pruritus, photosensitivity

SYST: Flulike symptoms, increased cholesterol levels

PHARMACOKINETICS

PO: Peak 2 hr, metabolized by CYP1A2, 2D6, 3A4 in liver; excreted in urine, feces; crosses placenta; half-life 20-40 hr, protein binding 85%

INTERACTIONS

⚠ **Increase:** hyperpyretic crisis, seizures, hypertensive episode—MAOIs

Increase: CNS depression—alcohol, barbiturates, benzodiazepines, other CNS depressants

Increase: serotonin syndrome—SSRIs, SNRIs, serotonin-receptor agonists, fenfluramine, dexfenfluramine, sibutramine, nefazodone

Decrease: effects of cloNIDine, indirect-acting sympathomimetics (ePHEDrine)

Drug/Herb

• Serotonin syndrome: St. John's wort

Increase: CNS depression—kava

Drug/Lab Test

Increase: serum bilirubin, blood glucose, alk phos

Decrease: VMA, 5-HIAA

False increase: urinary catecholamines

NURSING CONSIDERATIONS

Assess:

• B/P (lying, standing), pulse q4hr; if systolic B/P drops 20 mm Hg, hold prod-

uct, notify prescriber; vital signs q4hr in patients with CV disease
• Blood studies: CBC, leukocytes, differential, cardiac enzymes, lipid profile, blood glucose if patient is receiving long-term therapy
• Hepatic studies: AST, ALT, bilirubin, creatinine
• Weight weekly; appetite may increase with product
• ECG for flattening of T wave, bundle branch block, AV block, dysrhythmias in cardiac patients

Black Box Warning: Mental status: mood, sensorium, affect, suicidal tendencies (especially among adolescents, young adults), increase in psychiatric symptoms: depression, panic; EPS primarily in geriatric patients: rigidity, dystonia, akathisia

⚠ **Serotonin syndrome:** hyperthermia, hypertension, myoclonus, rigidity, delirium, coma; if using other serotonergic products
• Alcohol consumption; if alcohol consumed, hold dose until morning

Perform/provide:
• Storage in tight container at room temp; do not freeze
• Assistance with ambulation during beginning therapy, since drowsiness, dizziness occurs

Evaluate:
• Therapeutic response: decreased depression

Teach patient/family:
• That therapeutic effects may take 2-3 wk; to take at bedtime; that there is decreased sedation with increased doses
• To use caution when driving, performing other activities requiring alertness because of drowsiness, dizziness, blurred vision
• To avoid alcohol, other CNS depressants
• About how to take orally disintegrating tabs; dissolve on tongue, swallow
• Not to use within 14 days of MAOIs

Black Box Warning: To notify prescriber of suicidal thoughts, behavior

TREATMENT OF OVERDOSE:
ECG monitoring, lavage, activated charcoal; administer anticonvulsant, IV fluids

misoprostol (Rx)
(mye-soe-prost'ole)
Cytotec
Func. class.: Gastric mucosa protectant, antiulcer
Chem. class.: Prostaglandin E_1 analog

Do not confuse:
misoprostol/metoprolol
Cytotec/Cytoxan

ACTION:
Inhibits gastric acid secretion; may protect gastric mucosa; can increase bicarbonate, mucus production

USES:
Prevention of NSAID-induced gastric ulcers
Unlabeled uses: Pregnancy termination, postpartum hemorrhage, cervical ripening/labor induction (vaginal), active duodenal/gastric ulcer, kidney transplant rejection prophylaxis

CONTRAINDICATIONS:
Hypersensitivity to this product or prostaglandins

Black Box Warning: Pregnancy (X), females

Precautions: Breastfeeding, children, geriatric patients, renal/CV disease, abnormal fetal position, cardiac/renal/inflammatory bowel disease, C-section, dehydration, diarrhea, fever, ectopic pregnancy, fetal distress, sepsis, vaginal bleeding

DOSAGE AND ROUTES
• **Adult: PO** 200 mcg qid with food for duration of NSAID therapy, with last dose given at bedtime; if 200 mcg is not tolerated, 100 mcg may be given

Active duodenal/gastric ulcer (unlabeled)
• **Adult: PO** 100-200 mcg qid with meals at bedtime × 4-8 wk

Pregnancy termination prior to 63rd day (unlabeled)
• **Adult: INTRAVAGINALLY** 800 mcg 5-7 days after methotrexate IM
Cervical ripening induction for term pregnancy (unlabeled)
• **Adult: INTRAVAGINALLY** 25 mcg q3-6hr
Available forms: Tabs 100, 200 mcg
Administer:
• PO with meals for prolonged product effect; avoid use of magnesium antacids

SIDE EFFECTS

GI: *Diarrhea,* nausea, vomiting, flatulence, constipation, dyspepsia, abdominal pain
GU: Spotting, cramps, hypermenorrhea, menstrual disorders

PHARMACOKINETICS

PO: Peak 12 min, plasma steady state achieved within 2 days, excreted in urine

INTERACTIONS

Drug/Food
Decrease: maximum concentrations when taken with food

NURSING CONSIDERATIONS

Assess:
• **NSAID-induced ulcer prophylaxis:** monitor GI symptoms (hematemesis, occult or frank blood in stools, gastric aspirate, cramping, severe diarrhea)

Black Box Warning: Pregnancy (X): Obtain a negative pregnancy test; miscarriages are common

Perform/provide:
• Storage at room temp
Evaluate:
• Therapeutic response: absence of pain or GI complaints; prevention of ulcers
Teach patient/family:
• To take only as directed; to read patient information leaflet

Black Box Warning: Not to take if pregnant (can cause miscarriage) (X); not to become pregnant while taking product; if pregnancy occurs during therapy, discontinue product, notify prescriber; not to breastfeed

• Not to give product to anyone else or to take for more than 4 wk unless directed by prescriber
• To avoid OTC preparations: aspirin, cough, cold products; condition may worsen

⚠ HIGH ALERT

mitoMYcin (Rx)

(mye-toe-mye'sin)
Mitosol
Func. class.: Antineoplastic, antibiotic

Do not confuse:
mitoMYcin/mithramycin/mitotane/mitoXANtrone

ACTION: Inhibits DNA synthesis, primarily; derived from *Streptomyces caespitosus;* appears to cause cross-linking of DNA; vesicant

USES: Pancreatic, stomach, colorectal, bladder cancer
Unlabeled uses: Palliative treatment of anal, bladder, head, neck, colon, breast, biliary, cervical, lung malignancies; bone marrow ablation, desmoid tumor, mesothelioma, stem cell transplant preparation

CONTRAINDICATIONS: Pregnancy (D) 1st trimester, breastfeeding, hypersensitivity, as single agent, coagulation disorders

Black Box Warning: Thrombocytopenia

Precautions: Accidental exposure, acute bronchospasm, anemia, children, dental disease/work, extravasation, females, infection, radiation therapy, surgery, vaccines, renal/respiratory disease

Black Box Warning: Bone marrow suppression, hemolytic-uremic syndrome

DOSAGE AND ROUTES

• **Adult: IV** 20 mg/m² q6-8wk
Available forms: Inj 5, 20, 40 mg/vial
Administer:
Direct IV route
• Use port, or central line if possible
• Antiemetic 30-60 min before product to prevent vomiting
• IV after diluting 5 mg/10 ml, 20 mg/ 40 ml, 40 mg/80 ml (0.5 mg/ml) sterile water for inj; shake, allow to stand, give through Y-tube or 3-way stopcock; give slow IV push or infuse over 15-30 min; color of reconstituted sol is gray
• Avoid excessive heat, store reconstituted product in refrigerator, discard after 2 wk, store unreconstituted product at room temp

Y-site compatibilities: Amifostine, amphotericin B lipid complex, amphotericin B liposome, anidulafungin, argatroban, atenolol, bivalirudin, bleomycin, caspofungin, CISplatin, cyclophosphamide, DACTINomycin, dolasteron, DOXOrubicin, droperidol, epirubicin, ertapenem, fluorouracil, furosemide, granisetron, heparin, leucovorin, melphalan, methotrexate, metoclopramide, nesiritide, octreotide, ondansetron, oxaliplatin, PACLitaxel, palonosetron, PEMEtrexed, riTUXimab, teniposide, thiotepa, tigecycline, tirofiban, trastuzumab, vinBLAStine, vinCRIStine, voriconazole, zoledronic acid

SIDE EFFECTS

CNS: Fever, headache, confusion, drowsiness, syncope, fatigue
EENT: Blurred vision
GI: *Nausea, vomiting, anorexia, stomatitis,* hepatotoxicity, diarrhea
GU: Urinary retention, renal failure, edema
HEMA: Thrombocytopenia, leukopenia, anemia
INTEG: *Rash,* alopecia, extravasation, nail discoloration
MISC: Hemolytic uremic syndrome, CHF
RESP: Fibrosis, pulmonary infiltrate, dyspnea

PHARMACOKINETICS

Half-life 1 hr, metabolized in liver, 10% excreted in urine (unchanged)

INTERACTIONS

Increase: toxicity—other antineoplastics, radiation
Increase: bleeding risk—NSAIDs, anticoagulants
• Avoid use with vaccines
Drug/Herb
• Avoid use with black cohosh

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Bone marrow suppression: CBC, differential, platelet count weekly; withhold product if WBC is <4000/mm³, serum creatinine >1.7 mg/dl, or platelet count is <100,000/mm³; notify prescriber; bleeding: hematuria, guaiac, bruising, petechiae, mucosa or orifices

Black Box Warning: Fatal hemolytic-uremic syndrome: hypertension, thrombocytopenia, microangiopathic hemolytic anemia; occurs in those receiving long-term therapy

• Renal studies: BUN, serum uric acid, urine CCr, electrolytes before, during therapy, adjust dose based on renal function
• I&O ratio; report fall in urine output to <30 ml/hr
• Monitor temp q4hr; fever may indicate beginning infection
• Hepatic studies before, during therapy: bilirubin, AST, ALT, alk phos as needed or monthly; check for jaundiced skin and sclera, dark urine, clay-colored stools, itchy skin, abdominal pain, fever, diarrhea
⚠ **Pulmonary fibrosis:** bronchospasm, dyspnea, crackles, unproductive cough; chest pain, tachypnea, fatigue, increased pulse, pallor, lethargy; pulmonary function tests; chest x-ray before, during therapy; chest x-ray should be obtained q2wk during treatment

- Effects of alopecia on body image; discuss feelings about body changes
- Buccal cavity q8hr for dryness, sores, ulceration, white patches, oral pain, bleeding, dysphagia
- Local irritation, pain, burning at inj site
- GI symptoms: frequency of stools, cramping

Perform/provide:

- Adequate fluids 2-3 L/day unless contraindicated
- Rinsing of mouth tid-qid with water; brushing of teeth with baking soda bid-tid with soft brush or cotton-tipped applicators for stomatitis; use unwaxed dental floss

Evaluate:

- Therapeutic response: decreased tumor size, spread of malignancy

Teach patient/family:

- That hair may be lost during treatment; that wig or hairpiece may make patient feel better; that new hair may be different in color, texture
- To avoid foods with citric acid, hot or rough texture
- To report any bleeding, white spots, ulcerations in mouth; to examine mouth daily
- To report sign of IV site reaction, redness, inflammation, burning, pain
- To avoid crowds, persons with infections if granulocyte count is low
- **Infection:** report fever, flulike symptoms, sore throat
- To immediately report urine retention, absence of urine, dyspnea, bleeding, jaundice, signs of pulmonary toxicity
- To report if pregnancy is planned or suspected; pregnancy (D) 1st trimester, do not breastfeed

⚠ HIGH ALERT

mitoXANtrone (Rx)

(mye-toe-zan'trone)

Func. class.: Antineoplastic, antiinfective, immunomodulator

Chem. class.: Synthetic anthraquinone

Do not confuse:

mitoXANtrone/mitoMYcin/mithramycin/mitotane

ACTION: DNA reactive agent; cytocidal effect on both proliferating and nonproliferating cells; topoisomerase II inhibitor (vesicant)

USES: Acute myelogenous leukemia (adult), relapsed leukemia; used with steroids to treat bone pain (advanced prostate cancer), multiple sclerosis (MS)

Unlabeled uses: Liver malignancies, non-Hodgkin's lymphoma, breast cancer, ALL, bone marrow ablation, CLL, hepatocellular cancer, ovarian cancer, pleural effusion, stem cell transplant preparation

CONTRAINDICATIONS: Pregnancy (D), hypersensitivity

Precautions: Breastfeeding, children; myelosuppression, renal/cardiac/hepatic disease; gout

Black Box Warning: Secondary malignancy, neutropenia, intrathecal administration, extravasation, heart failure

DOSAGE AND ROUTES

Acute myelogenous leukemia/induction

- **Adult: IV INF** 12 mg/m^2/day on days 1-3 and 100 mg/m^2 cytarabine × 7 days as continuous 24-hr inf

Consolidation

- **Adult: IV** 12 mg/m^2 given as short 5- to 15-min inf for 2 days with cytarabine × 5 days

Advanced prostate cancer
• **Adult: IV** 12-14 mg/m² as single dose or short inf q21days
Multiple sclerosis, relapsing
• **Adult: IV INF** 12 mg/m² as 5- to 15-min inf q3mo, cumulative lifetime dose 140 mg/m²
Available forms: Inj 2, 10, 12.5, 15 mg/ml
Administer:
• Other medications by oral route if possible; avoid IM, SUBCUT, IV routes
• Antiemetic 30-60 min before product to prevent vomiting
Direct IV route
• IV after diluting with ≥50 ml NS or D_5W; give over 3-5 min into running IV of D_5W or NS; check for extravasation; do not give IM, SUBCUT, or intraarterially
Intermittent IV INF route
• May be diluted further in D_5W, NS, run over 15-30 min
Continuous IV INF route
• Give over 24 hr

Y-site compatibilities: Acyclovir, alemtuzumab, alfentanil, allopurinol, amikacin, aminocaproic acid, aminophylline, amiodarone, anidulafungin, argatroban, atracurium, bivalirudin, bleomycin, bretylium, bumetanide, buprenorphine, butorphanol, calcium chloride, calcium gluconate, CARBOplatin, carmustine, caspofungin, cefoTEtan, ceftizoxime, chloramphenicol, chlorproMAZINE, cimetidine, ciprofloxacin, cisatracurium, CISplatin, cladribine, codeine, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, DAUNOrubicin citrate liposome, dexmedetomidine, dexrazoxane, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, dolasetron, DOPamine, doxacurium, doxycycline, droperidol, enalaprilat, ePHEDrine, EPINEPHrine, erythromycin, esmolol, etoposide, etoposide phosphate, famotidine, fenoldopam, fentaNYL, filgrastim, fluconazole, fludarabine, fluorouracil, ganciclovir, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, haloperidol, hydrALAZINE, hydrocortisone sodium succinate, HYDROmorphone, hydrOXYzine, ifosfamide, imipenem-cilastatin, inamrinone, insulin regular, irinotecan, isoproterenol, ketorolac, labetalol, leucovorin, levofloxacin, levorphanol, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, melphalan, meperidine, meropenem, mesna, metaraminol, methohexital, methotrexate, methyldopate, metoclopramide, metoprolol, metroNIDAZOLE, midazolam, milrinone, minocycline, mivacurium, morphine sulfate, nalbuphine, naloxone, nesiritide, niCARdipine, nitroglycerin, norepinephrine, octreotide, ondansetron, oxaliplatin, palonosetron, pamidronate, pancuronium, pentamidine, pentazocine, PENTObarbital, PHENObarbital, phentolamine, phenylephrine, polymyxin b, potassium acetate, potassium chloride, procainamide, prochlorperazine, promethazine hydrochloride, propranolol, quiNIDine gluconate, quinupristin-dalfopristin, ranitidine, remifentanil, riTUXimab, rocuronium, sargramostim, sodium acetate, sodium bicarbonate, succinylcholine, SUFentanil, sulfamethoxazole-trimethoprim, tacrolimus, teniposide, theophylline, thiopental, thiotepa, tigecycline, tirofiban, tobramycin, tolazoline, trastuzumab, trimethobenzamide, vancomycin, vasopressin, vecuronium, verapamil, vinCRIStine, vinorelbine, zidovudine, zoledronic acid

SIDE EFFECTS

CNS: Headache, seizures, fatigue
CV: CHF, cardiopathy, dysrhythmias
EENT: Conjunctivitis, blue/green sclera, blurred vision
GI: *Nausea, vomiting, diarrhea, anorexia, mucositis,* hepatotoxicity, abdominal pain, constipation, jaundice
GU: Amenorrhea, menstrual disorders
HEMA: Thrombocytopenia, leukopenia, myelosuppression, anemia, secondary leukemia
INTEG: *Rash, necrosis at inj site,* dermatitis, thrombophlebitis at inj site, alopecia
MISC: Fever, hyperuricemia, infections

RESP: Cough, dyspnea
SYST: Tumor lysis syndrome, sepsis

PHARMACOKINETICS

Protein binding 78%; metabolized in liver; excreted via renal, hepatobiliary systems; half-life 23-215 hr

INTERACTIONS

Increase: bone marrow depression toxicity—radiation, other antineoplastics
Increase: adverse reactions—live virus vaccines, trastuzumab
Increase: bleeding risk—NSAIDs, anticoagulants
Increase: mitoXANtrone effects of—digoxin, phenytoin
Drug/Lab Test
Increase: LFTs, uric acid
Decrease: HcT/Hgb, platelets, WBC

NURSING CONSIDERATIONS

Assess:
• CBC, differential, platelet count weekly; withhold product if WBC is $<1500/mm^3$; leukopenia, neutropenia, thrombocytopenia are expected, leukocyte nadir 10-14 days, recovers in 2-3 wk
• **Hepatotoxicity:** hepatic studies before, during therapy: bilirubin, AST, ALT, alk phos prn or monthly; dose reduction needed with hepatic disease; jaundiced skin and sclera, dark urine, clay-colored stools, itchy skin, abdominal pain, fever, diarrhea
• Renal studies: BUN, serum uric acid, urine CCr, electrolytes before, during therapy
• Bleeding, hematuria, guaiac, bruising or petechiae, mucosa or orifices q8hr

Black Box Warning: ECG, ECHO, chest x-ray, MUGA, RAI angiography; assess ejection fraction before and during treatment; cardiotoxic may develop during treatment or months to years after treatment; use vigilant cardiac monitoring in MS

Black Box Warning: Secondary acute myelogenous leukemia (AML) that can develop after taking this product

Black Box Warning: **Multiple sclerosis:** obtain MUGA, LVEF baselines; repeat LVEF if symptoms of CHF occur or if cumulative dose is >100 mg/m^2; do not administer to patients who have received lifetime dose of ≥ 140 mg/m^2 or if LVEF $<50\%$ or significant LVEF

• Obtain pregnancy test for all women of childbearing age, even if birth control is used

Perform/provide:
• Rinsing of mouth tid-qid with water, club soda; brushing of teeth bid-qid with soft brush or cotton-tipped applicators for stomatitis; use unwaxed dental floss
• Increased fluids to 2-3 L/day unless contraindicated

Evaluate:
• Therapeutic response: decreased tumor size, spread of malignancy

Teach patient/family:
• To immediately report bleeding, dyspnea, possible infections, seizure, jaundice, fever, cough, or dyspnea
• To avoid hot foods or those with citric acid, rough texture
• To report any bleeding, white spots, ulcerations in mouth; to examine mouth daily
• To avoid crowds, persons with infections
• That sclera, urine may turn blue or green; that hair loss may occur

Black Box Warning: To notify prescriber if pregnancy is suspected or planned; to use effective contraception

modafinil (Rx)

(mo-daf'i-nil)
Alertec ♣, Provigil
Func. class.: CNS stimulant
Chem. class.: Racemic compound

Controlled Substance IV

ACTION: Similar action as that of sympathomimetics; does not alter release of dopamine, norepinephrine

USES: Narcolepsy, shift-work sleep disturbance, obstructive sleep apnea
Unlabeled uses: Fatigue in MS, ADHD

CONTRAINDICATIONS: Hypersensitivity, ischemic heart disease, left ventricular hypertrophy, chest pain, dysrhythmias
Precautions: Pregnancy (C), breastfeeding, child <16 yr, geriatric patients, unstable angina, history of MI, severe hepatic disease

DOSAGE AND ROUTES

To improve wakefulness with daytime sleepiness
• **Adult and adolescent ≥16 yr: PO** 200 mg daily
Hepatic dose (severe hepatic disease)
• **Adult: PO** 100 mg daily
Multiple sclerosis (unlabeled)
• **Adult/geriatric/adolescents ≥6 yr: PO** 200-400 mg daily in the AM
Available forms: Tabs 100, 200 mg
Administer:
• Give 1 hr before start of shift work or in AM for those with narcolepsy or sleep apnea

SIDE EFFECTS

CNS: *Headache,* anxiety, cataplexy, depression, dizziness, insomnia, amnesia, confusion, ataxia, tremors, paresthesia, dyskinesia, suicidal ideation
CV: Dysrhythmias, hypo/hypertension, chest pain, vasodilation
EENT: Change in vision, *rhinitis,* pharyngitis, epistaxis
GI: Nausea, vomiting, changes in LFTs, anorexia, diarrhea, thirst, mouth ulcers
GU: Ejaculation disorder, urinary retention, albuminuria
HEMA: Eosinophilia
INTEG: Rash, dry skin, herpes simplex, Stevens-Johnson syndrome
MISC: Infection, hyperglycemia, neck pain
RESP: *Dyspnea,* lung changes

PHARMACOKINETICS

Absorbed rapidly, 60% protein binding, metabolized by the liver (90%), half-life 15 hr, peak 2-4 hr

INTERACTIONS

Increase: Altered levels of CYP3A4 inhibitors (azole antibiotics some SSRIs), reaction difficult to predict
Increase: levels of CYP2C19 substrates (diazepam, phenytoin some tricyclics)
Decrease: effects of—cycloSPORINE, hormonal contraceptives, theophylline, estrogens
Delayed effect modafinil by 1 hr: methylphenidate
Altered: Levels of CYP3A4 inducers (carBAMazepine, phenytoin, rifampin, cycloSPORINE, theophylline)
Drug/Herb
Increase: stimulation—cola nut, guarana, yerba maté, coffee, tea
Drug/Lab Test
Increase: LFTs, glucose, eosinophils

NURSING CONSIDERATIONS

Assess:
• Narcolepsy, shift work, history of sleep apnea
• Depression, suicidal ideation
• Monitor B/P in those with hypertension
Perform/provide:
• Storage at room temp
Evaluate:
• Ability to stay awake
Teach patient/family:
• To take only as directed; that product may be taken with/without food
• To use other form of contraception during and for ≥30 days after discontinuing medication if using hormonal birth control; to notify prescriber if pregnancy is planned or suspected or if breastfeeding
• To notify prescriber of allergic reaction, tremors, confusion
• To avoid all OTC medications unless approved by prescriber
• To avoid hazardous activities until drug effect is known

montelukast (Rx)

(mon-teh-loo'kast)

Singulair

Func. class.: Bronchodilator

Chem. class.: Leukotriene receptor antagonist, cysteinyl

ACTION: Inhibits leukotriene (LTD_4) formation; leukotrienes exert their effects by increasing neutrophil, eosinophil migration; aggregation of neutrophils, monocytes; smooth muscle contraction, capillary permeability; these actions further lead to bronchoconstriction, inflammation, edema

USES: Chronic asthma in adults and children, seasonal allergic rhinitis, bronchospasm prophylaxis

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (B), breastfeeding, children <6 yr, acute attacks of asthma, alcohol consumption, severe hepatic disease, corticosteroid withdrawal, phenylketonuria

DOSAGE AND ROUTES

- **Adult and child ≥15 yr: PO** 10 mg/day in PM
- **Child 6-14 yr: PO** 5-mg chew tab/day in PM
- **Child 2-5 yr: PO** (chew tab/granules) 4 mg/day

Asthma

- **Child 12-23 mo: PO** 1 packet (4 mg) granules taken in PM

Exercise-induced bronchoconstriction

- **Adult/child ≥6 yr: PO** 10 mg 2 hr before exercise; do not take another dose within 24 hr

Available forms: Tabs 10 mg; chew tabs 4, 5 mg; oral granules 4 mg/packet

Administer:

PO route

- In PM daily for all uses except exercise-induced bronchoconstriction; then take 2 hr before exercise
- Granules directly in mouth or mixed with spoonful of soft food (carrots, applesauce, ice cream, rice)
- Do not open granules packet until ready to use; mix whole dose; give within 15 min

SIDE EFFECTS

CNS: *Dizziness, fatigue, headache,* behavior changes, hallucinations, seizures, agitation, anxiety, depression, fever, drowsiness

GI: *Abdominal pain,* dyspepsia, nausea, vomiting, diarrhea, pancreatitis

HEMA: Thrombocytopenia

INTEG: Rash, pruritus, erythema

MS: Asthenia, myalgia, muscle cramps

RESP: *Influenza, cough,* nasal congestion

SYST: Anaphylaxis, angioedema, Churg-Strauss syndrome, Stevens-Johnson syndrome, toxic epidermal necrolysis

PHARMACOKINETICS

Rapidly absorbed; peak 3-4 hr, chew tab (5 mg) 2-2.5 hr; half-life 2.7-5.5 hr, extended in hepatic disease; protein binding 99%; metabolized by liver; excreted via bile

INTERACTIONS

Increase: adverse reactions of CYP2C8 substrates

Decrease: montelukast levels—barbiturates, rifabutin, rifapentine, carBAMazepine, fosphenytoin, phenytoin, rifampin

Drug/Herb

Increase: stimulation—black, green tea, guarana

Drug/Lab Test

Increase: ALT, AST

NURSING CONSIDERATIONS

Assess:

⚠ **Churg-Strauss syndrome:** rare adult patients carefully for symptoms: eosinophilia, vasculitic rash, worsening pulmonary symptoms, cardiac complications, neuropathy

- Allergic reactions: rash, urticaria; product should be discontinued

⚠ For behavior changes and suicidal ideation, other neuropsychiatric reactions

• **Severe hepatic disease:** use cautiously

Evaluate:

• Therapeutic response: ability to breathe more easily

Teach patient/family:

• To check OTC medications, current prescription medications for ePHEDrine, which will increase stimulation; to avoid alcohol

• To avoid hazardous activities; dizziness may occur

• That product is not to be used for acute asthma attacks

• If aspirin sensitivity is known, not to take NSAIDs while taking this product

• To continue to use inhaled β-agonists if exercise-induced asthma occurs

• **Granules:** to give directly in mouth or mixed in a spoonful of room temperature soft food (use only applesauce, carrots, rice, or ice cream) use within 15 min of opening packets, discard used portions

⚠ HIGH ALERT

morphine (Rx)

(mor'feen)

Astramorph PF, Avinza, Depo Dur, Infumorph PF, Kadian, M.O.S. ♣, MS Contin, MSIR ♣, Oramorph SR

Func. class.: Opioid analgesic

Chem. class.: Alkaloid

Controlled Substance Schedule II

Do not confuse:

morphine/HYDROmorphone

MS Contin/oxyCONTIN

ACTION: Depresses pain impulse transmission at the spinal cord level by interacting with opioid receptors

USES: Moderate to severe pain

CONTRAINDICATIONS: Hypersensitivity, addiction (opioid), hemorrhage, bronchial asthma, increased intracranial pressure, paralytic ileus, hypovolemia, shock

Black Box Warning: Respiratory depression

Precautions: Pregnancy (C), breastfeeding, children <18 yr, geriatric patients, addictive personality, acute MI, severe heart disease, renal/hepatic disease, bowel impaction, abrupt discontinuation

Black Box Warning: Accidental exposure, epidural/intrathecal administration, opioid-naive patients, substance abuse

DOSAGE AND ROUTES

Acute moderate to severe pain

PO regular-release route

• **Adult ≥50 kg:** Initially, 10–30 mg every 3–4 hr as needed

• **Adult <50 kg/geriatric patients:** Might require lower doses and/or extended dosing intervals; doses should be titrated carefully

• **Child/infant ≥6 mo:** 0.2–0.5 mg/kg every 4–6 hr as needed

• **Infants <6 mo/neonate: PO** 0.1 mg/kg every 3–4 hr

IV/IM/SUBCUT route

• **Adult ≥50 kg:** 2.5–15 mg every 2–6 hr as needed, titrate; or a loading dose of 0.05–0.1 mg/kg IV, followed by 0.8–10 mg/hr IV, titrate

• **Adult <50 kg/geriatric patients:** Might require lower doses and/or extended dosing intervals 0.1 mg/kg every 3–4 hr, titrate

• **Child/infant ≥6 mo:** 0.05–0.2 mg/kg every 2–4 hr, titrate to relief; max initial dose 15 mg/dose

• **Infants <6 mo/neonate:** 0.03–0.05 mg/kg every 3–8 hr, titrate to relief

Epidural (morphine sulfate injection, but *not* DepoDur)

• **Adult:** Initially, 5 mg in the lumbar region; if pain relief does not occur in 1 hr, give 1–2 mg epidurally; max 10 mg/24

hr; **continuous epidural infusion** 2–4 mg/24 hr; may give another 1–2 mg

Intrathecal route (morphine sulfate injection, but *not* DepoDur)

• Do not inject >2 ml of the 0.5 mg/ml or 1 ml of the 1 mg/ml ampule

• **Adult:** 0.2–1 mg in the lumbar area as a single dose or to establish dosage for continuous intrathecal infusion; repeated injections are not recommended

Rectal route

• **Adult: PR** 10–20 mg every 4 hr, as needed

• **Child:** Individualize

Chronic moderate and severe pain:

⚠ Do not use extended-release cap or tab as prn analgesics, for acute pain, or if the pain is mild or not expected to persist for an extended period of time; use for postoperative pain only if the patient is receiving chronic opioid therapy before surgery or if the postoperative pain is expected to be moderate to severe and expected to persist for an extended period of time; do not use controlled-release tablets (MS Contin) immediately after surgery (for the first 24 hr) in patients not previously taking the drug

⚠ Do not use in opioid-naïve patients: 90 mg, 120 mg morphine biphasic-release capsules (AVINza); 100 mg, 130 mg, 150 mg, 200 mg morphine extended-release capsules (Kadian), 100 mg, 200 mg morphine control-release tablets (MS Contin); patients considered opioid tolerant are those who are taking at least 60 mg/day oral morphine, 30 mg/day oral OxyCODONE, 8 mg/day oral HYDROmorphone, or an equal dose of another opioid, for 1 wk or longer

PO (extended-release tab [MS Contin, Oramorph SR] or caps [Kadian, AVINza]) (opiate)

• **Adult:** 15–30 mg every 12 hr (tabs); 10 mg bid or 20 mg every day (Kadian); or 30 mg every day (AVINza), titrate; AVINza should be adjusted in increments ≤30 mg every 4 days; Kadian should be increased ≤20 mg every 1–2 days, taper gradually; to discontinue, gradually decrease AVINza and Kadian every 2–4 days

• **Child (unlabeled):** 0.3–0.6 mg/kg every 12 hr (tabs)

IV/SUBCUT route (opiate)

• **Adult: IV** 2–10 mg loading dose, then 0.8–10 mg/hour IV, titrate; maintenance 0.8–80 mg/hour IV

• **Children/infants ≥6 mo: IV** Initially, 0.04–0.07 mg/kg/hr (range: 0.025–2.6 mg/kg/hr)

• **Subcut infusion** 0.025–1.79 mg/kg/hour

• Infants <6 mo/neonate: **IV** 0.01 mg/kg/hour initially; infusion rates max 0.015–0.02 mg/kg/hour IV

Breakthrough pain in patients receiving long-acting or continuous-infusion morphine

PO (regular-release) route

• **Adult/child:** The dose is usually 1/4 to 1/3 the 8- to 12-hour extended-release dose every 4–6 hr as needed

• **Adult/child:** For PCA, intermittent dosage is usually 25%–30% of the hourly rate IV/SC every 6–15 min as needed; intermittent IV injection dosage is 25%–30% of the hourly rate given IV/SC every 1–2 hr as needed

Available forms: Inj 0.5, 1, 2, 4, 5, 8, 10, 15, 25, 50 mg/ml; oral sol 10, 20 mg/5 ml, 10 mg/0.5 ml, 100 mg/5 ml; oral tabs 15, 30 mg; rect supp 5, 10, 20, 30 mg; ext rel tabs 15, 30, 60, 100, 200 mg; cont rel cap pellets (Kadian) 10, 20, 30, 50, 60, 80, 100, 200 mg; ext rel caps (AVINza) 30, 45, 60, 75, 90, 120 mg

Administer:

PO route

• Give with food or milk to minimize GI effects

• Begin with immediate-release products and titrate to correct dose and convert to a sustained-release product

• **Immediate-release cap:** May swallow whole, or cap may be opened and contents sprinkled on cool food (pudding or applesauce) or added to juice; give immediately or delivered via gastric or NG tube by either adding to or following with liquid

• **Extended-release and controlled-**

release tabs: Swallow whole; do not crush, break, dissolve, or chew
• The use of MS Contin 100 mg or 200 mg tabs should be limited to opioid-tolerant patients requiring oral doses equivalent to ≥200 mg/day; use of the 100 mg or 200 mg tablet is only recommended for patients who have already been titrated to a stable analgesic regimen using lower strengths of MS Contin or other opioids
• **Sustained-release caps:** Swallow; do not chew, crush, or dissolve; caps may be opened and contents sprinkled on applesauce (at room temperature or cooler) immediately before ingestion; do not chew, crush, or dissolve the pellets/beads inside the cap; the applesauce should be swallowed without chewing; if the pellets/beads are chewed, an immediate release of a potentially fatal morphine dose may be delivered; rinse mouth to ensure all the pellets/beads have been swallowed; do not separate applesauce into separate doses; the entire portion should be taken; discard unused portion
• **Kadian caps:** may be given through a 16-F gastrostomy tube; flush with water, and sprinkle the cap contents into 10 ml of water; using a funnel and a swirling motion, pour the pellets and water into the tube; rinse the beaker with 10 ml of water, and pour the water into the funnel; repeat until no pellets remain in the beaker. Do not administer AVINza tabs through a gastrostomy tube; *do not* administer Kadian or AVINza through a nasogastric tube
• Avoid concurrent administration of AVINza with prescription or nonprescription medications that contain alcohol; Consumption of alcohol while taking the extended-release capsules can result in the rapid release and absorption of a potentially fatal dose of morphine
• AVINza ≥90 mg or Kadian 100 mg, 130 mg, 150 mg, or 200 mg caps are given only to opioid-tolerant patients

Oral liquid
• Check dose before use because many concentrations of oral solution are available; may be diluted in fruit juice, protect from light

Injectable administration
• Visually inspect for particulate matter, discoloration before use, do not use if a precipitate is present after shaking, do not use the Duramorph solution if a precipitate is present or if the color is darker than pale yellow

SUBCUT route
• Inject, taking care not to inject intradermally
• **Continuous SC infusion** Morphine is not approved by the FDA for subcut use; dilute to an appropriate concentration in D_5W, give using a portable, controlled, subcut device; adjust rate based on patient response and tolerance; max subcut rate is 2 ml/hour/site

Intrathecal/epidural route
⚠ Morphine sulfate injection is not interchangeable with morphine sulfate extended-release liposome injection (DepoDur); DepoDur is only for epidural administration
⚠ Do not use Infumorph (10 mg/ml or 25 mg/ml) for single-dose neuraxial injection because lower doses can be more reliably administered with Duramorph (0.5 mg/ml or 1 mg/ml

Rectal route
• Moisten the suppository with water before insertion; if suppository is too soft, chill in the refrigerator for 30 min or run cold water over it before removing the wrapper

IV route
• Before use, an opiate antagonist and emergency facilities should be available
⚠ Do not use the highly concentrated morphine injections (i.e., 10–25 mg/ml) for IV, IM, or SC administration of single doses; these injection solutions are intended for use via continuous, controlled microinfusion devices
• **Direct IV route** Dilute dose with ≥5 ml of sterile water for injection or NS injection; inject 2.5–15 mg directly into a vein or into the tubing of a freely flowing IV solution over 4–5 min, do not give rapidly

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• **Continuous IV infusion** Dilute in 5% dextrose, use a controlled-infusion device; adjust dosage and rate based on patient response

• **Patient-controlled analgesia (PCA)** A compatible patient-controlled infusion device must be used; dilute solutions to obtain a concentration of 1 or 10 mg/ml for ease in calculations and programming of PCA pumps; adjust dosage and rate based on patient response; consult the patient-controlled infusion device manual for directions on rate of infusion

Syringe compatibilities: Atropine, bupivacaine, butorphanol, cimetidine, diMENHYDRINATE, diphenhydrAMINE, droperidol, fentaNYL, glycopyrrolate, hydrOXYzine, ketamine, metoclopramide, midazolam, milrinone, pentazocine, perphenazine, promazine, ranitidine, scopolamine

Y-site compatibilities: Allopurinol, amifostine, amikacin, aminophylline, amiodarone, ampicillin, ampicillin/sulbactam, amsacrine, atenolol, atracurium, aztreonam, bumetanide, calcium chloride, cefamandole, ceFAZolin, cefmetazole, cefotaxime, cefoTEtan, cefOXitin, cefTAZidime, ceftizoxime, cefTRIAXone, cefuroxime, cephalothin, chloramphenicol, cisatracurium, cladribine, clindamycin, cyclophosphamide, cytarabine, dexamethasone, digoxin, diltiazem, DOBUTamine, DOPamine, doxycycline, enalaprilat, EPINEPHrine, erythromycin, esmolol, etomidate, famotidine, fentaNYL, filgrastim, fluconazole, fludarabine, foscarnet, gentamicin, granisetron, heparin, hydrocortisone, HYDROmorphone, kanamycin, labetalol, lidocaine, LORazepam, magnesium sulfate, melphalan, meropenem, methotrexate, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, mezlocillin, midazolam, milrinone, moxalactam, nafcillin, niCARdipine, nitroglycerin, norepinephrine, ondansetron, oxacillin, oxytocin, PACLitaxel, pancuronium, penicillin G potassium, piperacillin, piperacillin/tazobactam, potassium chloride, propranolol, ranitidine, remifentanil, sodium bicarbonate, teniposide, thiotepa, ticarcillin, ticarcillin/clavulanate, tobramycin, vancomycin, vecuronium, vinorelbine, vit B/C, warfarin, zidovudine

SIDE EFFECTS

CNS: Drowsiness, dizziness, confusion, headache, sedation, euphoria, insomnia, seizures

CV: Palpitations, bradycardia, change in B/P, shock, cardiac arrest, chest pain, hypo/hypertension, edema, tachycardia

EENT: Tinnitus, blurred vision, miosis, diplopia

GI: Nausea, vomiting, anorexia, constipation, cramps, biliary tract pressure

GU: Urinary retention

HEMA: Thrombocytopenia

INTEG: Rash, urticaria, bruising, flushing, diaphoresis, pruritus

RESP: Respiratory depression, respiratory arrest, apnea

PHARMACOKINETICS

PO: Onset variable, peak variable, duration variable

IM: Onset ½ hr, peak 50-90 min, duration 3-7 hr

SUBCUT: Onset 15-20 min, peak 50-90 min, duration 3-5 hr

IV: Peak 20 min

RECT: Peak ½-1 hr, duration 4-5 hr

Intrathecal: Onset rapid, duration ≤24 hr

Metabolized by liver, crosses placenta; excreted in urine, breast milk; half-life 1½-2 hr

INTERACTIONS

• Unpredictable reaction, avoid use: MAOIs

Increase: effects with other CNS depressants—alcohol, opiates, sedative/hypnotics, antipsychotics, skeletal muscle relaxants

Decrease: morphine action—rifampin

Drug/Herb

Increase: anticholinergic effect—corkwood

Increase: CNS depression—chamomile, hops, kava, St. John's wort, valerian

Drug/Food

Decrease: morphine effect—cranberry juice (excessive amounts), oats

Drug/Lab Test

Increase: amylase

NURSING CONSIDERATIONS

Assess:

- **Pain:** location, type, character; give dose before pain becomes severe
- Bowel status; constipation common, use stimulant laxative if needed
- I&O ratio; check for decreasing output; may indicate urinary retention
- B/P, pulse, respirations (character, depth, rate)
- CNS changes: dizziness, drowsiness, hallucinations, euphoria, LOC, pupil reaction
- **Abrupt discontinuation:** gradually taper to prevent withdrawal symptoms; decrease by 50% q1-2days; avoid use of narcotic antagonists
- Allergic reactions: rash, urticaria

Black Box Warning: Accidental exposure: if Duramorph or Infumorph gets on skin, remove contaminated clothing, rinse affected area with water

- **Respiratory dysfunction:** depression, character, rate, rhythm; notify prescriber if respirations are <12/min; accidental overdose has occurred with high-potency oral sols

Perform/provide:

- Storage in light-resistant container at room temp
- Assistance with ambulation
- Safety measures: side rails, night-light, call bell within easy reach
- Gradual withdrawal after long-term use

Evaluate:

- Therapeutic response; decrease in pain intensity

Teach patient/family:

- To change position slowly; orthostatic hypotension may occur
- To report any symptoms of CNS changes, allergic reactions
- That physical dependency may result from long-term use
- To avoid use of alcohol, CNS depressants
- That withdrawal symptoms may occur: nausea, vomiting, cramps, fever, faintness, anorexia

TREATMENT OF OVERDOSE:

Naloxone (Narcan) 0.2-0.8 mg IV, (caution with opioid-tolerant individuals) O_2, IV fluids, vasopressors

moxifloxacin (Rx)

Avelox, Avelox IV

Func. class.: Antiinfective

Chem. class.: Fluoroquinolone

ACTION: Interferes with conversion of intermediate DNA fragments into high-molecular-weight DNA in bacteria; DNA gyrase inhibitor

USES: Acute bacterial sinusitis: *Streptococcus pneumoniae, Haemophilus influenzae, Moraxella catarrhalis;* acute bacterial exacerbation of chronic bronchitis: *S. pneumoniae, H. influenzae, Haemophilus parainfluenzae, Klebsiella pneumoniae, Staphylococcus aureus, M. catarrhalis;* community-acquired pneumonia: *S. pneumoniae, H. influenzae, Mycoplasma pneumoniae, Chlamydia pneumoniae, M. catarrhalis;* uncomplicated skin/skin-structure infections: *S. aureus, Streptococcus pyogenes;* complicated intraabdominal infections including polymicrobial infections: *E. coli, Bacterioides fragilis, S. anginosus, S. constellatus, Enterococcus faecalis, Proteus mirabilis, Clostridium perfringens, Bacteroides thetaiotaomicron, Peptostreptococcus* sp; complicated skin, skin-structure infections caused by methicillin-susceptible: *S. aureus, E. coli, K. pneumoniae, Enterobacter cloacae*

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CONTRAINDICATIONS: Hypersensitivity to quinolones

Precautions: Pregnancy (C), breastfeeding, children, hepatic/cardiac/renal/GI disease, epilepsy, uncorrected hypokalemia, prolonged QT interval; patients receiving class IA, III antidysrhythmics; seizure disorder

Black Box Warning: Tendon pain, rupture; tendinitis

DOSAGE AND ROUTES

Acute bacterial sinusitis
- **Adult: PO/IV** 400 mg q24hr × 10 days

Acute bacterial exacerbation of chronic bronchitis
- **Adult: PO/IV** 400 mg q24hr × 5 days

Community-acquired pneumonia
- **Adult: PO/IV** 400 mg q24hr × 7-14 days

Uncomplicated skin/skin-structure infections
- **Adult: PO/IV** 400 mg q24hr × 7 days

Complicated intraabdominal infections
- **Adult: IV** 400 mg/day × 5-14 days

Complicated skin, skin-structure infections
- **Adult: PO/IV** 400 mg/day × 7-21 days

Available forms: Tabs 400 mg; inj premix 400 mg/250 ml

Administer:

PO route
- 4 hr before or 8 hr after antacids, zinc, iron, calcium
- Without regard to food
- Store at room temperature

IV route
- Discontinue primary IV while administering moxifloxacin, give over 60 min
- Do not give SUBCUT, IM
- Available as premixed sol; may be diluted at ratios from 1:10 to 10:1; do not refrigerate; give by direct inf or through Y-type inf set; do not add other medications to sol or inf through same IV line at same time
- Do not refrigerate
- Flush line with compatible sol before and after use
- Do not admix

Solution compatibilities: 0.9% NaCl, D_5, D_{10}, LR, sterile water for inj

SIDE EFFECTS

CNS: *Headache,* dizziness, fatigue, insomnia, depression, *restlessness,* seizures, confusion, increased intracranial pressure, peripheral neuropathy, pseudotumor cerebri

CV: Prolonged QT interval, dysrhythmias, torsades de pointes, tachycardia

EENT: Blurred vision, tinnitus, taste changes

GI: *Nausea, diarrhea,* increased ALT, AST, flatulence, heartburn, *vomiting,* oral candidiasis, dysphagia, pseudomembranous colitis

INTEG: *Rash,* pruritus, urticaria, photosensitivity, flushing, fever, chills

MS: Tremor, arthralgia, tendinitis, tendon rupture, myalgia

SYST: Anaphylaxis, Stevens-Johnson syndrome

PHARMACOKINETICS

Excreted in urine as active product, metabolites; parent product excreted in urine (20%), feces (25%); terminal half-life PO 12-16 hr, IV 8-15 hr

INTERACTIONS

Increase: moxifloxacin serum levels—probenecid

Increase: warfarin, cycloSPORINE effect

Increase: seizure risk—NSAIDs

Black Box Warning: Increase: tendon rupture—corticosteroids

Decrease: moxifloxacin absorption—magnesium antacids, aluminum hydroxide, zinc, iron, sucralfate, calcium, enteral feeding, didanosine

NURSING CONSIDERATIONS

Assess:
- CNS symptoms: headache, dizziness, fatigue, insomnia, depression, seizures

• Renal, hepatic studies: BUN, creatinine, AST, ALT
• I&O ratio, urine pH <5.5 is ideal
⚠ Allergic reactions, Stevens-Johnson syndrome, toxic epidermal necrolysis, anaphylaxis: fever, flushing, rash, urticaria, pruritus, sore throat, fatigue, ulcers, other lesions; keep EPINEPHrine, emergency equipment nearby for anaphylaxis

Black Box Warning: Tendon pain, rupture, tendinitis; if tendon becomes inflamed, product should be discontinued, more common in Achilles tendon

⚠ Cardiac status: prolonged QT or use of products that increase QT prolongation
⚠ Pseudomembranous colitis: assess for diarrhea, abdominal pain, fever, fatigue, anorexia; possible anemia, elevated WBC, low serum albumin; stop product; usually either vancomycin or IV metroNIDAZOLE given

Perform/provide:
• Increased fluids to 3 L/day to avoid crystallization in kidneys

Evaluate:
• Therapeutic response: decreased pain, C&S; absence of infection

Teach patient/family:

Black Box Warning: To notify prescriber of tendon pain, inflammation; stop drug

• Not to take any products containing magnesium or calcium (such as antacids), iron, or aluminum with this product or 4 hr before or 8 hr after
• That photosensitivity may occur; to avoid sunlight or use sunscreen to prevent burns
• To use frequent rinsing of mouth, sugarless candy or gum for dry mouth
• To take as prescribed; not to double or miss doses
• If dizziness occurs, to ambulate, perform activities with assistance
• To complete full course of product therapy
• To contact prescriber if abnormal heart rhythm or seizures occur

moxifloxacin (ophthalmic)

(mocks-ih-floks'a-sin)

Vigamox, Moxeza

Func. class.: Ophthalmic anti-infective

Chem. class.: Fluoroquinolone

Do not confuse: ciprofloxacin/gatifloxacin/levofloxacin

ACTION: Inhibits DNA gyrase, thereby decreasing bacterial replication

USES: Bacterial conjunctivitis (aerobic gram-positive/negative organisms), *Chlamydia trachomatis*

CONTRAINDICATIONS: Hypersensitivity to this product or fluoroquinolones

Precautions: Pregnancy (C), breastfeeding

DOSAGE AND ROUTES

Bacterial conjunctivitis

• **Adult/adolescent/child ≥1 yr: Ophthalmic SOL** 1 drop in affected eye(s) bid (Moxeza) or tid (Vigamox) × 7 days

Available forms: Ophthalmic solution 0.5%

Administer:

Ophthalmic route

• Commercially available ophthalmic solutions are not for injection subconjunctivally or into the anterior chamber of the eye
• Apply topically to the eye, taking care to avoid contamination
• Do not touch the tip of the dropper to the eye, fingertips, or other surface
• Apply pressure to lacrimal sac for 1 min after instillation
• Avoid wearing contact lenses during treatment

SIDE EFFECTS

EENT: Hypersensitivity, pruritus, blurred vision, tearing

PHARMACOKINETICS

Half-life 13 hr

NURSING CONSIDERATIONS

Assess:

• **Allergic reaction**: Assess for hypersensitivity, discontinue product

Evaluate:

• Decreased ophthalmic infection

Teach patient/family:

Ophthalmic route

• To apply topically to the eye, taking care to avoid contamination

• That product is for ophthalmic use only

• Not to touch the tip of the dropper to the eye, fingertips, or other surface

• To apply pressure to lacrimal sac for 1 min after installation

• To avoid wearing contact lenses during treatment

mupirocin (topical, nasal)

(myoo-pihr'oh-sin)

Bactroban, Centany

Func. class.: Topical anti-infective

ACTION: Antibacterial activity results from inhibition of protein synthesis; bacteriostatic

USES: Impetigo, skin lesions *(Staphylococcus aureus/Streptococcus pyogenes)*; nasal: methicillin-resistant *S. aureus*

CONTRAINDICATIONS: Hypersensitivity to this product

Precautions: Open wounds, burns, severe kidney disease, children

DOSAGE AND ROUTES

Impetigo

• **Adult/child: TOP** apply to affected area tid × 1-2 wk

Skin lesions

• **Adult/child: TOP** apply to affected area tid × 10 days

Methicillin-resistant *S. Aureus* in the nose

• **Adult/child ≥12 yr: NASAL** divide ointment in single use tube in half; use in each nostril bid × 5 days

Available forms: Topical cream, ointment 2%; intranasal ointment 2%

Administer:

Topical route

• Do not use skin products near the eyes, nose, or mouth

• Wash hands before and after use; wash affected area and gently pat dry

• May cover treated areas with gauze dressing

Cream/ointment

• Apply a thin film to the cleansed affected area; massage gently into affected areas

• **Nasal:** Close nostrils by squeezing and releasing and gently massaging over 1 min

SIDE EFFECTS

CNS: Headache

EENT: Burning, rhinitis (nasal)

GI: Taste change

INTEG: Burning, rash, pruritus

INTERACTIONS

Decrease: Effect of other nasal products

NURSING CONSIDERATIONS

Assess:

• **Allergic reaction**: Assess for hypersensitivity, product may need to be discontinued

• **Infection**: Assess for number of lesions, severity in impetigo, other skin disorders

Evaluate:

• Decreased lesions in impetigo, other skin disorders

Teach patient/family:

Topical route

• Not to use skin products near the eyes, nose, or mouth

• To wash hands before and after use and to wash affected area and gently pat dry

• **Cream/Ointment:** To apply a thin film to the cleansed affected area; to cover treated areas with gauze dressing if desired
• **Nasal:** To close nostrils by squeezing and releasing and gently massaging over 1 min

mycophenolate mofetil (Rx)

(mye-koe-phen'oh-late)
CellCept, Myfortic
Func. class.: Immunosuppressant

ACTION: Inhibits inflammatory responses that are mediated by the immune system

USES: Prophylaxis for organ rejection in allogenic cardiac, hepatic, renal transplants
Unlabeled uses: Refractory uveitis, second-line therapy for Churg-Strauss syndrome, diffuse proliferative lupus nephritis (in combination), rheumatoid arthritis, psoriasis, GVHD, kidney disease, myasthenia gravis, atopic dermatitis

CONTRAINDICATIONS: Hypersensitivity to this product or mycophenolic acid

Black Box Warning: Pregnancy (D)

Precautions: Breastfeeding, lymphomas, neutropenia, renal disease, accidental exposure, anemia

Black Box Warning: Infection, neoplastic disease

DOSAGE AND ROUTES

Renal transplant
To prevent organ rejection
• **Adult: PO** mycophenolate mofetil 1 g or 720 mg mycophenolate sodium; 1 g or 720 mg bid given to renal transplant patients in combination with corticosteroids, cycloSPORINE
• **Child: PO-ER** 400 mg/m² bid, max 720 mg bid

Renal dose
• **Adult: PO/IV** GFR <25 ml/min, max 2 g/day

Cardiac transplant
To prevent organ rejection
• **Adult: PO/IV** 1.5 g bid, **IV** can be started ≤24 hr after transplant, switch to **PO** when able

Hepatic transplant
To prevent organ rejection
• **Adult: PO** 1.5 g bid; **IV** 1 g over ≥2 hr

Refractory acute kidney transplant rejection (unlabeled)
• **Adult: PO** 1.5 g (Mofetil) bid

Rheumatoid arthritis (unlabeled)
• **Adult: PO** 250 mg-2 g/day (Mofetil)

GVHD (unlabeled)
• **Adult: PO** 2 g/day (Mofetil) with cycloSPORINE and prednisoLONE

Diffuse proliferative lupus nephritis (unlabeled)
• **Adult: PO** 1 g/day (Mofetil)

Uveitis (unlabeled)
• **Adult: PO** 1 g (Mofetil) bid × 6-41 mo

Atopic dermatitis (unlabeled)
• **Adult: PO** 1 g (Mofetil) bid × 4 wk, then 500 mg bid × 4 wk
• **Adolescent/child ≥2 yr: PO** 30-50 mg/kg/day (Mofetil) in 2 divided doses

Available forms: Caps 250 mg; tabs 500 mg; inj (powder) 500 mg/20-ml vial; powder for oral susp 200 mg/ml; ext rel tab (Myfortic) 180, 360 mg

Administer:
• May be given in combination with corticosteroids, cycloSPORINE
• Del rel tab, cap, oral susp, tab are not interchangeable

PO route
• Do not break, crush, or chew tabs; do not open caps
• Give at same time each day
• Avoid inhalation or direct contact with skin, mucous membranes; teratogenic in animals
• **Oral susp:** tap closed bottle several times to loosen powder, use 94 ml of water in graduated cylinder, add ½ total amount of water for constitution and shake the closed bottle, add remaining

M

water and shake; again, remove child-resistant cap, push adapter into neck of bottle, close tightly
• Give alone for better absorption

Intermittent IV INF route

• Reconstitute each vial with 14 ml D_5W, shake gently, further dilute to 6 mg/ml, dilute 1 g/140 ml D_5W, 1.5 g/210 ml D_5W; give by slow IV inf ≥2 hr, never give by bolus or rapid IV inj
• Do not give with other medications or sol

Y-site compatibilities: Alemtuzumab, alfentanil, amikacin, anidulafungin, argatroban, bivalirudin, caspofungin, cefepime, DAPTOmycin, DOPamine, norepinephrine, octreotide, oxytocin, tacrolimus, tigecycline, tirofiban, vancomycin

SIDE EFFECTS

CNS: *Tremor, dizziness, insomnia, headache, fever,* anxiety, pain, progressive multifocal leukoencephalopathy, asthenia, paresthesia
CV: *Hypertension, chest pain,* hypotension, edema
GI: *Diarrhea, constipation, nausea, vomiting,* stomatitis, GI bleeding, abdominal pain, anorexia, dyspepsia
GU: *UTI, hematuria,* renal tubular necrosis, polyomavirus-associated nephropathy
HEMA: Leukopenia, thrombocytopenia, anemia, pancytopenia, pure red cell aplasia, neutropenia
INTEG: *Rash*
META: *Peripheral edema, hypercholesterolemia, hypophosphatemia, edema, hyperkalemia, hypokalemia, hyperglycemia,* hypocalcemia, hypomagnesemia
MS: Arthralgia, muscle wasting, back pain, weakness
RESP: *Dyspnea, respiratory infection, increased cough, pharyngitis, bronchitis, pneumonia,* plural effusion, pulmonary fibrosis
SYST: Lymphoma, *nonmelanoma skin carcinoma,* sepsis

PHARMACOKINETICS

Rapidly and completely absorbed; metabolized to active metabolite (MPA); excreted in urine, feces; protein binding (MPA) 97%; half-life (MPA) 17.9 hr

INTERACTIONS

Increase: bone marrow suppression—azaTHIOprine
• Increased bleeding risk: anticoagulants, NSAIDs, thrombolytics, salicylates
Increase: toxicity—acyclovir, ganciclovir, valacyclovir
Increase: effects of phenytoin, theophylline
Increase: mycophenolate levels—probenecid, immunosuppressives, salicylates
Decrease: mycophenolate levels—antacids (magnesium, aluminum), cholestyramine, cycloSPORINE, rifamycin
Decrease: protein binding of phenytoin, theophylline
Decrease: effect of live attenuated vaccines, oral contraceptives

Drug/Herb

Interference with immunosuppression: astragalus, echinacea, melatonin

Drug/Food

Decrease: absorption if taken with food

Drug/Lab Test

Increase: serum creatitine, BUN
• Abnormal LFTs

NURSING CONSIDERATIONS

Assess:

⚠ **Progressive multifocal leukoencephalopathy,** may be fatal; ataxia, confusion, apathy, hemiparesis, visual problems, weakness; side effects should be reported to FDA
• Blood studies: CBC during treatment monthly
• Hepatic studies: alk phos, AST, ALT, bilirubin
• Renal studies: BUN, CCr, electrolytes

Black Box Warning: Pregnancy test within 1 wk before initiation of treatment; confirm negative pregnancy test

Evaluate:
- Therapeutic response: absence of graft rejection

Teach patient/family:
- To report fever, rash, severe diarrhea, chills, sore throat, fatigue because serious infections may occur
- To reduce risk of infection by avoiding crowds
- About the need for repeated lab tests

Black Box Warning: To use 2 forms of contraception before, during, and for 6 wk after therapy

- To take at same time each day

nabumetone (Rx)

(na-byoo'me-tone)

Func. class.: Nonsteroidal antiinflammatory

Chem. class.: Acetic acid derivative

ACTION: Metabolite inhibits COX-1, COX-2 by blocking arachidonate; analgesic, antiinflammatory, antipyretic

USES: Osteoarthritis, rheumatoid arthritis, acute or chronic treatment

CONTRAINDICATIONS: Pregnancy (D) 3rd trimester; hypersensitivity to this product or aspirin, iodides, NSAIDs

Black Box Warning: Perioperative pain with CABG surgery

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, bleeding/GI/cardiac/renal disorders, hepatic dysfunction, asthma, bone marrow suppression, lupus (SLE), ulcerative colitis, blood dyscrasias

Black Box Warning: MI, stroke, GI bleeding

DOSAGE AND ROUTES

- **Adult: PO** 1 g as single dose or divided bid; max 2 g/day if needed

Renal dose
- **Adult: PO** CCr 31-49 ml/min, 750 mg daily, max 1 g/day; CCr <30 ml/min 500 mg daily

Available forms: Tabs 500, 750 mg

Administer:
- With food or antacids

SIDE EFFECTS

CNS: Dizziness, headache, drowsiness, fatigue, tremors, confusion, insomnia, anxiety, depression, nervousness

EENT: Tinnitus

CV: Tachycardia, peripheral edema, palpitations, dysrhythmias, CHF, MI, stroke

GI: Nausea, anorexia, vomiting, diarrhea, jaundice, cholestatic hepatitis, constipation, flatulence, cramps, dry mouth, peptic ulcer, gastritis, ulceration, perforation, bleeding

GU: Nephrotoxicity, dysuria, hematuria, oliguria, azotemia, cystitis

HEMA: Blood dyscrasias

INTEG: Purpura, rash, pruritus, sweating, photosensitivity

RESP: Dyspnea, pharyngitis, bronchospasm

SYST: Anaphylaxis, angioneurotic edema

PHARMACOKINETICS

PO: Peak 2½-4 hr; protein binding >99%; half-life 24 hr; metabolized in liver to active metabolite; excreted in urine (metabolites), breast milk

INTERACTIONS

Increase: bleeding risk—anticoagulants, thrombolytics, valproic acid, cefamandole, cefoTEtan, cefoperazone, plicamycin, clopidogrel, eptifibatide, ticlopidine, SSRIs, SNRIs

Increase: hematologic toxicity—antineoplastics, radiation

Increase: GI reactions—salicylates, NSAIDs, alcohol, potassium, corticosteroids

Increase: toxicity, effect of—lithium, methotrexate

Decrease: effect of diuretics, antihypertensives

Drug/Lab Test
Increase: bleeding time, potassium, BUN, AST, ALT, LDH, alk phos, creatinine
Decrease: CCr, blood glucose, Hct, Hgb

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Cardiac status: CV thrombotic events, MI, stroke; may be fatal, not to be used in perioperative pain after CABG

Black Box Warning: GI status: ulceration, bleeding, perforation; may be fatal

- **Pain:** frequency, intensity, characteristics; relief of pain after taking product
- Asthma, aspirin sensitivity, or nasal polyps; increased hypersensitivity reactions
- Renal, hepatic studies: BUN, creatinine, AST, ALT, Hgb, LDH, blood glucose, WBC, platelets; CCr before treatment, periodically thereafter
- Audiometric, ophthalmic exam before, during, after treatment
- For eye, ear problems: blurred vision, tinnitus; may indicate toxicity

Perform/provide:
- Storage at room temp

Evaluate:
- Therapeutic response: decreased pain and stiffness in joints

Teach patient/family:
- To avoid alcoholic beverages and aspirin
- ⚠ To report blurred vision, ringing, roaring in ears; may indicate toxicity
- To avoid driving, other hazardous activities if dizziness, drowsiness occur
- ⚠ To report change in urine pattern, increased weight, edema, increased pain in joints, fever, blood in urine; indicates nephrotoxicity
- That therapeutic effects may take up to 1 mo
- To take with a full glass of water and food or antacids to enhance absorption; to sit upright for 30 min
- To report dark stools; may indicate GI bleeding
- To use sunscreen, wear protective clothing if in the sun
- To report use to all health care providers, to avoid all other products unless approved by prescriber

nadolol (Rx)

(nay-doe'lole)

Corgard

Func. class.: Antihypertensive, antianginal

Chem. class.: β-Adrenergic receptor blocker

Do not confuse:
Corgard/Cognex/Coreg
Nadolol/Mandol

ACTION: Long-acting, nonselective β-adrenergic receptor blocking agent, blocks β_1 in the heart and β_2 in the lungs, uterus, and circulatory system; mechanism is similar to that of propranolol

USES: Chronic stable angina pectoris, mild to moderate hypertension
Unlabeled uses: Tachydysrhythmias, anxiety, tremors, esophageal varices (rebleeding only), prophylaxis of migraine headaches, portal hypertension

CONTRAINDICATIONS: Hypersensitivity to this product, cardiac failure, cardiogenic shock, 2nd/3rd degree heart block, bronchospastic disease, sinus bradycardia, CHF, COPD
Precautions: Pregnancy (C), breastfeeding, diabetes mellitus, renal disease, hyperthyroidism, peripheral vascular disease, myasthenia gravis, major surgery, nonallergic bronchospasm

Black Box Warning: Abrupt discontinuation

DOSAGE AND ROUTES

- **Adult: PO** 40 mg/day, increase by 40-80 mg q3-7days; maintenance 40-240 mg/day for angina, 40-320 mg/day for hypertension

• **Geriatric: PO** 20 mg/day, may increase by 20 mg until desired dose

Renal dose

• **Adult: PO** CCr 31-50 ml/min, give q24-36hr; CCr 10-30 ml/min, give q24-48hr; CCr <10 ml/min, give q40-60hr

Migraine prevention (unlabeled)

• **Adult: PO** 80-240 mg/day × 2-18 mo

Available forms: Tabs 20, 40, 80 mg

Administer:

• With 8 oz water, check apical pulse prior to use, if <60 bpm, withhold; call prescriber

• Give without regard to food

SIDE EFFECTS

CNS: Depression, dizziness, *fatigue*, lethargy, paresthesias, headache, *weakness*, insomnia, memory loss, nightmares

CV: Bradycardia, *hypotension*, CHF, palpitations, AV block, chest pain, peripheral ischemia, flushing, edema, vasodilation, conduction disturbances

EENT: Blurred vision, dry eyes, nasal congestion

ENDO: Hyperglycemia, hypoglycemia

GI: Nausea, vomiting, diarrhea, colitis, constipation, cramps, dry mouth, flatulence, hepatomegaly, pancreatitis, taste distortion

GU: *Impotence*, decreased libido

HEMA: Agranulocytosis, thrombocytopenia

INTEG: Rash, pruritus, fever, alopecia

RESP: Dyspnea, respiratory dysfunction, bronchospasm, cough, wheezing, pulmonary edema, pharyngitis, laryngospasm

PHARMACOKINETICS

PO: Onset variable, peak 3-4 hr, duration 17-24 hr; half-life 20-24 hr; not metabolized; excreted in urine (unchanged), bile, breast milk; protein binding 30%

INTERACTIONS

• Do not use with MAOIs; bradycardia may occur

• Peripheral ischemia: ergots

Increase: bradycardia—digoxin

Increase: hypotension, bradycardia—cloNIDine, EPINEPHrine

Increase: hypotensive effects—other hypotensive agents, phenothiazines

Decrease: β-blocking effect—thyroid hormones

Decrease: antihypertensive effect—NSAIDs

Drug/Lab Test

Increase: serum potassium, serum uric acid, ALT, AST, alk phos, LDH, blood glucose, cholesterol, ANA, triglycerides

NURSING CONSIDERATIONS

Assess:

• B/P, pulse, respirations during beginning therapy; orthostatic hypotension may occur

• Weight daily; report gain of 5 lb

• I&O ratio, CCr if kidney damage diagnosed; crackles, jugular venous distention, fatigue, dyspnea

• **Pain:** duration, time started, activity being performed, character

• Headache, lightheadedness, decreased B/P; may indicate a need for decreased dosage

Black Box Warning: Abrupt discontinuation: can result in MI, myocardial ischemia, ventricular dysrhythmias, severe hypertension; withdraw slowly by tapering

Evaluate:

• Therapeutic response: decreased B/P, heart rate, symptoms of angina

Teach patient/family:

• That product may mask signs of hypoglycemia or alter blood glucose in diabetics

• To avoid OTC products unless prescriber approves

• To avoid hazardous activities if dizziness occurs

• **Hypertension:** to comply with complete medical regimen; to report weight gain of >5 lb, swelling, unusual bruising, bleeding

• To rise slowly to prevent orthostatic hypotension

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• About how and when to check B/P, pulse; to hold dose, contact prescriber if pulse ≤60 bpm, systolic B/P <90 mm Hg

Black Box Warning: Not to discontinue abruptly, may cause life-threatening cardiac changes

nafcillin (Rx)

(naf-sill'in)

Func. class.: Antiinfective, broad-spectrum

Chem. class.: Penicillinase-resistant penicillin

ACTION: Bacteriocidal, interferes with cell wall replication of susceptible organisms; cell lysis mediated by cell wall autolytic enzymes

USES: Effective for gram-positive cocci *(Staphylococcus aureus, Streptococcus viridans, Streptococcus pneumoniae)*, infections caused by penicillinase-producing *Staphylococcus*

CONTRAINDICATIONS: Hypersensitivity to penicillins or corn

Precautions: Pregnancy (B), breast-feeding, neonates; hypersensitivity to cephalosporins or carbapenems; GI disease, asthma

DOSAGE AND ROUTES

• **Adult: IV** 500-2000 mg q4hr

• **Child and infant >1 mo: IV** 50-200 mg/kg/day in divided doses q4-6hr

• **Neonates >7 days (weight >2000 g): IV** 25 mg/kg q6hr

• **Neonates ≤7 days (weight <2000 g): IV** 25 mg/kg q8hr

Meningitis

• **Adult: IV** 100-200 mg/kg/day in divided doses q4-6hr, max 12 g/day

• **Neonates >7 days (weight >2000 g): IV** 50 mg/kg q6hr

• **Neonates ≤7 days (weight <2000 g): IV** 50 mg/kg q12hr

Available forms: Powder for inj 1, 2 g, premixed or Add-Vantage vials

Administer:

• Product after C&S has been drawn, begin therapy while waiting for results

IM route

• Reconstitute vials: add 1.7 (1.8 nafcil), 3, 4, or 6.4 ml (6.6 ml NaCl) (sterile water for inj, 0.9% NaCl, bacteriostatic water for inj with benzyl alcohol or parabens) to vials with 1 g, 2 g of nafcillin, respectively (250 mg/ml)

• No further dilution needed; after reconstitution, inject in deep muscle mass

IV route

• Reconstitute vials: add 1.7 (1.8 nafcil), 3, 4, or 6.4 ml (6.6 ml NaCl) sterile water for inj, 0.9% NaCl, bacteriostatic water for inj with benzyl alcohol or parabens) to vials with 1 g, 2 g of nafcillin, respectively (250 mg/ml)

• **Nallpen piggyback units:** reconstitute 1 or 2 g with 50-100 ml or 99 ml, respectively, of sterile water for inj, 0.45% NaCl, 0.9% NaCl

• **Unipen piggyback units:** reconstitute according to manufacturer

Direct Intermittent IV INJ route

• Further dilute reconstituted sol in 15-30 ml sterile water inj, 0.45% NaCl, 0.9% NaCl; inj slowly over 5-10 min into tubing of free-flowing compatible IV solution

Intermittent IV INF route

• Vials, further dilute reconstituted sol to 2-40 mg/ml for peripheral vein inf ≤20 mg/ml (preferred); piggyback unit, no further dilution needed; infuse ≥30-60 min, make sure entire dose is given before ≥10% of sol is inactivated

Y-site compatibilities: Acyclovir, atropine, cyclophosphamide, diazepam, enalaprilat, esmolol, famotidine, fentaNYL, fluconazole, foscarnet, heparin, HYDROmorphone, magnesium sulfate, morphine, perphenazine, propofol, theophylline, zidovudine

SIDE EFFECTS

CNS: Lethargy, hallucinations, anxiety, depression, twitching, coma, seizures

GI: *Nausea, vomiting, diarrhea,* increased AST, ALT, abdominal pain, glossitis, pseudomembranous colitis
GU: Oliguria, proteinuria, hematuria, vaginitis, moniliasis, glomerulonephritis, interstitial nephritis
HEMA: Anemia, increased bleeding time, bone marrow depression, neutropenia
INTEG: Tissue necrosis, extravasation injury at inj site
SYST: Anaphylaxis, serum sickness, Stevens-Johnson syndrome

PHARMACOKINETICS

Half-life 1 hr; metabolized by liver; excreted in bile, urine 90% protein bound

INTERACTIONS

• Avoid use with tetracyclines
Increase: nafcillin concentrations—probenecid
Decrease: effect of cycloSPORINE—warfarin
Decrease: nafcillin effect—chloramphenicol, macrolides, sulfonamides, tetracyclines, aminoglycosides
Drug/Food
Decrease: absorption—food, carbonated drinks, citrus fruit juices
Decrease: Hgb/HcT, neutrophils
Drug/Lab Test
False positive: urine glucose, urine protein

NURSING CONSIDERATIONS

Assess:
• I&O ratio; report hematuria, oliguria, high doses are nephrotoxic
• **Pseudomembranous colitis:** assess for diarrhea, abdominal pain, fever, fatigue, anorexia; possible anemia, elevated WBC, low serum albumin; stop product; usually either vancomycin or IV metroNIDAZOLE given
• Hepatic studies: AST, ALT
• Blood studies: CBC with differential bleeding time
⚠ Renal studies: urinalysis, BUN, creatinine; abnormal urinalysis may indicate nephrotoxicity
• C&S before product therapy; product may be given as soon as culture is taken
• Respiratory status: rate, character, wheezing, tightness in chest
⚠ Allergies before initiation of treatment; monitor for anaphylaxis, dyspnea, rash, laryngeal edema; stop product; keep emergency equipment nearby; skin eruptions after administration of penicillin to 1 wk after discontinuing product; cross-sensitivity with cephalosporins may occur
• Differential WBC 2 × per wk in patients receiving long-term therapy
• IV site: for redness, swelling, pain at site
Perform/provide:
• Extravasation management with cold packs, hyaluronidase
Evaluate:
• Therapeutic response: absence of fever, draining wounds
Teach patient/family:
⚠ To report sore throat, fever, fatigue (may indicate superinfection); CNS reactions; pseudomembraneous colitis (diarrhea, fever, abdominal pain, fatigue)
• To wear or carry emergency ID if allergic to penicillins

TREATMENT OF ANAPHYLAXIS: Withdraw product; maintain airway; administer EPINEPHrine, aminophylline, O_2, IV corticosteroids

⚠ HIGH ALERT

nalbuphine (Rx)

(nal'byoo-feen)
Func. class.: Opioid analgesic
Chem. class.: Synthetic opioid agonist, antagonist

ACTION: Depresses pain impulse transmission at the spinal cord level by interacting with opioid receptors

USES: Moderate to severe pain, supplement to anesthesia

CONTRAINDICATIONS:

Hypersensitivity, addiction (opiate)

Precautions: Pregnancy (C), breastfeeding, addictive personality, increased intracranial pressure, MI (acute), severe heart disease, respiratory depression, renal/hepatic disease, bowel impaction

DOSAGE AND ROUTES

Analgesic

• **Adult: SUBCUT/IM/IV** 10 mg q3-6hr prn (based on 70-kg body weight), max 160 mg/day (IV/IM/SUBCUT); 20 mg/dose if opiate naïve (IV/IM/SUBCUT)

Balanced anesthesia adjunct

• **Adult: IV** 0.3-3 mg/kg given over 10-15 min, may give 0.25-0.5 mg/kg as needed for maintenance

Available forms: Inj 10, 20 mg/ml

Administer:

• With antiemetic if nausea, vomiting occur

• When pain beginning to return; determine dosage interval by response

IM route

• IM deep in large muscle mass, rotate inj sites, protect from light

Direct IV route

• Undiluted ≤10 mg over 3-5 min into free-flowing IV line of D_5W, NS, or LR

Syringe compatibilities: Atropine, cimetidine, diphenhydrAMINE, droperidol, glycopyrrolate, hydrOXYzine, lidocaine, midazolam, prochlorperazine, ranitidine, scopolamine, trimethobenzamide

Y-site compatibilities: Amifostine, aztreonam, cefmetazole, cisatracurium, cladribine, filgrastim, fludarabine, granisetron, melphalan, PACLitaxel, propofol, remifentanil, teniposide, thiotepa, vinorelbine

SIDE EFFECTS

CNS: *Drowsiness, dizziness, confusion, headache, sedation, euphoria,* dysphoria (high doses), hallucinations, dreaming, tolerance, physical, psychologic dependency

CV: Palpitations, bradycardia, change in B/P, orthostatic hypotension, cardiac arrest

EENT: Tinnitus, blurred vision, miosis, diplopia

GI: *Nausea, vomiting, anorexia, constipation, cramps,* abdominal pain, dyspepsia, xerostomia, bitter taste

GU: Increased urinary output, dysuria, urinary retention, urgency

INTEG: *Rash,* urticaria, bruising, flushing, diaphoresis, pruritus

RESP: Respiratory depression, pulmonary edema

PHARMACOKINETICS

SUBCUT/IM/IV: Peak 30 min, onset 2-15 min, IV 2-3 min, duration 3-6 hr, metabolized by liver, excreted by kidneys, half-life 3-6 hr

INTERACTIONS

⚠ Avoid use with MAOIs; unpredictable reactions may occur

Increase: effects with other CNS depressants—alcohol, opiates, sedative/hypnotics, antipsychotics, skeletal muscle relaxants

NURSING CONSIDERATIONS

Assess:

• **Pain:** type, location, intensity before and 30-60 min after administration; titrate upward with 25%-50% until 50% of pain reduced; need for pain medication by pain sedation scoring, physical dependency

• Bowel status; constipation is common, may need laxative or stool softener

⚠ **Withdrawal reactions** in opiate-dependent individuals: PE, vascular occlusion; abscesses, ulcerations, nausea, vomiting, seizures; low potential for dependence

• **CNS changes:** dizziness, drowsiness, hallucinations, euphoria, LOC, pupil reaction

• Allergic reactions: rash, urticaria

• **Respiratory dysfunction: respiratory depression,** character, rate,

rhythm; notify prescriber if respirations are <10/min

Perform/provide:

- Storage in light-resistant area at room temp

Evaluate:

- Therapeutic response: decrease in pain without respiratory depression

Teach patient/family:

- To report any symptoms of CNS changes, allergic reactions
- That physical dependency may result from long-term use; low potential for dependency
- That withdrawal symptoms may occur: nausea, vomiting, cramps, fever, faintness, anorexia, profuse sweating, twitching; without treatment symptoms resolve in 5-14 days, chronic abstinence syndrome may last 2-6 mo
- To avoid CNS depressants, alcohol
- To avoid driving, operating machinery if drowsiness occurs

TREATMENT OF OVERDOSE:

Naloxone (Narcan) 0.2-0.8 mg IV, O_2, IV fluids, vasopressors

naloxone (Rx)

(nal-oks'one)

Func. class.: Opioid antagonist, antidote

Chem. class.: Thebaine derivative

Do not confuse:

naloxone/naltrexone

ACTION:

Competes with opioids at opiate receptor sites

USES:

Respiratory depression induced by opioids, pentazocine, propoxyphene

Unlabeled uses: IBS, opiate agonist dependence, opiate agonist-induced constipation, pruritus, urinary retention, coma, nausea, vomiting

CONTRAINDICATIONS:

Hypersensitivity

Precautions: Pregnancy (C), breastfeeding, children, neonates, CV disease, opioid dependency, seizure disorder, drug dependency

DOSAGE AND ROUTES

Opioid-induced respiratory depression

- **Adult: IV/SUBCUT/IM** 0.4-2 mg, repeat q2-3min if needed, max 10 mg
- **Child <5 yr or ≤20 kg: IV/SUBCUT/IM** 0.01 mg/kg slowly followed by 0.1 mg/kg if needed or as **INF** titrated to response

Postoperative opioid-induced respiratory depression

- **Adult: IV** 0.1-0.2 mg q2-3min prn
- **Child: IV/SUBCUT/IM** 0.005-0.01 mg/kg q2-3min prn

Opioid overdose

- **Adult: IV/SUBCUT/IM** 0.4-2 mg (10 mcg/kg) (not opioid dependent), may repeat q2-3min; 0.1-0.2 mg q2-3min (opioid dependent)

Diagnosis of opiate-agonist dependence (unlabeled)

- **Adult: IM** 0.16 mg; if no withdrawal symptoms after 20-30 min, give 0.24 mg **IV**

Available forms: Inj 0.02, 0.4 mg/ml

Administer:

- Only with resuscitative equipment, O_2 nearby
- Only sol prepared within 24 hr

Direct IV route

- Undiluted with sterile water for inj; give ≤0.4 mg over 15 sec

Continuous IV INF route

- Dilute 2 mg/500 ml 0.9% NaCl or D_5W (4 mcg/ml), titrate to response

Y-site compatibilities: Acyclovir, alfentanil, amikacin, aminocaproic acid, aminophylline, anidulafungin, ascorbic acid, atenolol, atracurium, atropine, azaTHIOprine, aztreonam, benztropine, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, caspofungin, cefamandole, ceFAZolin, cefmetazole, cefonicid, cefoperazone, cefotaxime, cefo-

N

TEtan, cefOXitin, cefTAZidime, ceftizoxime, cefTRIAXone, cefuroxime, cephalothin, cephapirin, chloramphenicol, chlorproMAZINE, cimetidine, CISplatin, clindamycin, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, doxacurium, DOXOrubicin, doxycycline, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, epoetin alfa, eptifibatide, ertapenem, erythromycin, esmolol, etoposide, etoposide phosphate, famotidine, fenoldopam, fentaNYL, fluconazole, fludarabine, fluorouracil, folic acid, furosemide, ganciclovir, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, heparin, hydrocortisone, hydrOXYzine, IDArubicin, ifosfamide, imipenem-cilastatin, inamrinone, indomethacin, insulin (regular), irinotecan, isoproterenol, ketorolac, labetalol, levofloxacin, lidocaine, linezolid, LORazepam, mannitol, mechlorethamine, meperidine, metaraminol, methicillin, methotrexate, methoxamine, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, mezlocillin, miconazole, midazolam, milrinone, minocycline, mitoXANtrone, morphine, moxalactam, multiple vitamins, mycophenolate, nafcillin, nalbuphine, nesiritide, netilmicin, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxacillin, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pamidronate, pancuronium, papaverine, PEMEtrexed, penicillin G potassium/sodium, pentamidine, pentazocine, PENTobarbital, PHENobarbital, phentolamine, phenylephrine, phytonadione, piperacillin, piperacillin-tazobactam, polymyxin B, potassium chloride, procainamide, prochlorperazine, promethazine, propofol, propranolol, protamine, pyridoxine, quiNIDine, quinupristin-dalfopristin, ranitidine, ritodrine, rocuronium, sodium acetate/bicarbonate, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiamine, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, tobramycin, tolazoline, trimetaphan, urokinase, vancomycin, vasopressin, vecuronium, verapamil, vinCRIStine, vinorelbine, voriconazole, zoledronic acid

SIDE EFFECTS

CNS: Drowsiness, nervousness, seizures, tremor
CV: Rapid pulse, increased systolic B/P (high doses), ventricular tachycardia, fibrillation, hypo/hypertension, cardiac arrest, sinus tachycardia
GI: Nausea, vomiting, hepatotoxicity
RESP: Hyperpnea, pulmonary edema

PHARMACOKINETICS

Well absorbed IM, SUBCUT; metabolized by liver, crosses placenta; excreted in urine, breast milk; half-life 30-81 min
IM/SUBCUT: Onset 2-5 min, duration 45-60 min
IV: Onset 1 min, duration 45 min

INTERACTIONS

Increase: seizures—traMADol overdose
Decrease: effect of opioid analgesics

NURSING CONSIDERATIONS

Assess:
- **Withdrawal:** cramping, hypertension, anxiety, vomiting, signs of withdrawal in drug-dependent individuals may occur ≤2 hr after administration
- VS q3-5min
- ABGs including Po_2, Pco_2
- Cardiac status: tachycardia, hypertension; monitor ECG
- **Respiratory dysfunction:** respiratory depression, character, rate, rhythm; if respirations are <10/min, administer naloxone; probably due to opioid overdose; monitor LOC
- **Pain:** duration, intensity, location before and after administration; may be used for respiratory depression

Perform/provide:
- Dark storage at room temp

Evaluate:
• Therapeutic response: reversal of respiratory depression; LOC—alert
Teach patient/family:
• When patient is lucid, about reasons for, expected results of product

naltrexone (Rx)

(nal-trex'one)
ReVia, Vivitrol
Func. class.: Opioid antagonist
Chem. class.: Thebaine derivative

Do not confuse:
naloxone/naltrexone

ACTION: Competes with opioids at opioid-receptor sites

USES: Blockage of opioid analgesics; used for treatment of opiate addiction, alcoholism
Unlabeled uses: Nicotine withdrawal, opiate-agonist withdrawal, pruritus

CONTRAINDICATIONS: Hypersensitivity, opioid dependence
Black Box Warning: Hepatic failure, hepatitis
Precautions: Pregnancy (C), breastfeeding, children, renal disease, depression, suicidal ideation
Black Box Warning: Hepatic disease

DOSAGE AND ROUTES

Adjunct in opiate-agonist dependence
• **Adult: PO** 25 mg; if no withdrawal symptoms in 1 hr, then 25 mg additionally; if no withdrawal symptoms, then 50-150 mg/day or in divided doses
Adjunct in alcoholism treatment
• **Adult: PO** 50 mg/day with food × 12 wk; **IM** (Vivitrol) 380 mg q4wk
Pruritus (unlabeled)
• **Adult: PO** 50 mg/day × 7 days to 4 wk
Nicotine withdrawal (unlabeled)
• **Adult: PO** 50 mg/day
Ultrarapid opiate detoxification (unlabeled)
• **Adult: PO** 50 mg prior to sedation with midazolam
Available forms: Tabs 50 mg; powder for inj 380 mg
Administer:
PO route
• Give with food, antacid to prevent nausea, vomiting
IM route
• Do not give until opioid-free for 7-10 days to prevent opioid withdrawal
• IM deep in gluteal, alternate inj sites; use supplied needle to prevent inj site reaction; aspirate before inj
• Only if resuscitative equipment is nearby
• Not to use IV or SUBCUT

SIDE EFFECTS

CNS: *Stimulation, drowsiness,* dizziness, confusion, **seizures,** headache, flushing, hallucinations, nervousness, irritability, **suicidal ideation,** syncope, anxiety
CV: Rapid pulse, **pulmonary edema,** hypertension, **DVT**
EENT: Tinnitus, hearing loss, blurred vision
GI: *Nausea, vomiting, diarrhea, heartburn,* anorexia, **hepatitis,** constipation, abdominal pain
GU: Delayed ejaculation, decreased potency
INTEG: *Rash,* urticaria, bruising, oily skin, acne, pruritus, inj site reactions
MISC: Increased thirst, chills, fever
MS: Joint and muscle pain
RESP: Wheezing, hyperpnea, nasal congestion, rhinorrhea, sneezing, sore throat, pneumonia

PHARMACOKINETICS

Metabolized by liver, excreted by kidneys; crosses placenta, excreted in breast milk; half-life 4 hr; extensive first-pass metabolism; protein binding 21%-28%

N

PO: Onset 15-30 min, peak 1-2 hr, duration is dose dependent
IM: Peak 2 hr

INTERACTIONS

Increase: lethargy—phenothiazines
Increase: hepatotoxicity—disulfiram
Increase: bleeding risk—anticoagulants
Decrease: effect of analgesics, antidiarrheals, cough preparations

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Hepatic status: LFTs, jaundice, hepatitis, hepatic failure

- ABGs including Po_2, Pco_2, LFTs, VS q3-5min
- Signs of withdrawal in drug-dependent individuals, use naltrexone challenge to test opioid dependence; must be free of opioids for 7-10 days before using this product, or withdrawal symptoms can occur
- Cardiac status: tachycardia, hypertension
- **Respiratory dysfunction: respiratory depression,** character, rate, rhythm; if respirations <10/min, respiratory stimulant should be administered
- Mental status: depression, suicidal ideation

Perform/provide:

- Storage in tight container

Evaluate:

- Therapeutic response: blocking opiate ingestion; successful nicotine, alcohol withdrawal

Teach patient/family:

- That patient must be drug-free to start treatment
- That using opioid while taking this product could prove fatal because high dose is needed to overcome this antagonist; not to self-dose with OTC products unless approved by prescriber
- To carry emergency ID stating product used
- That, if surgery is needed, all involved should be aware of this product
- To use caution while driving or performing other hazardous tasks until effect is known
- That suicidal thoughts/behaviors may occur; to report these immediately

naphazoline nasal agent

See Appendix B

naphazoline (ophthalmic)

(na-faz'oh-leen)

Advanced Eye Relief, Redness Maximum Relief, Ak-Con, All Clear, Clear Eyes, Naphcon Forte ♣, Vasoclear

Func. class.: Ophthalmic vasoconstrictor

Chem. class.: Sympathomimetic

ACTION: Acts on the blood vessels in the eye to produce vasoconstriction

USES: Ocular congestion, irritation, itching of the eye

CONTRAINDICATIONS: Hypersensitivity, acute angle-closure glaucoma, 0.1% solution in children/infants
Precautions: Hyperthyroidism, diabetes mellitus, hypertension, cardiac conditions

DOSAGE AND ROUTES

- **Adult: OPHTH** Instill 1-2 drops in affected eye in the conjunctival sac every 3-4 hr, up to qid

Available forms: Ophthalmic solution 0.012%, 0.1%, 0.02%
Administer:

- Store at room temperature, keep tightly closed

SIDE EFFECTS

CNS: Headache
EENT: Blurred vision, irritation, photophobia, dilation, stinging, elevated IOP, keratitis

PHARMACOKINETICS

Onset 10 min, duration up to 6 hr

INTERACTIONS

Increase: Systemic effects—β-blockers
• Do not use within 14 days of MAOIs

NURSING CONSIDERATIONS

Assess:
• Ocular itching, congestion, irritation: should show improvement quickly, avoid using more than 3 days, long-term use or exceeding dosage can lead to rebound congestion; report eye pain, blurred vision

Evaluate:
• Decreasing ocular itching, congestion, irritation

Teach patient/family:
• Method for instilling drops
• To notify prescriber of eye pain, blurred vision
• That ocular itching, congestion, irritation should show improvement quickly
• To avoid using longer than 3 days; that long-term use or exceeding dosage can lead to rebound congestion
• To wait for at least 15 min before wearing contact lenses

naproxen (Rx, OTC)

Aleve, Anaprox, Anaprox DS, Apo-Napro-Na ✤, EC-Naprosyn, Equaline All Day Relief, Good Sense All Day Pain Relief, Midol Extended Relief, Naprelan, Novo-Naprox ✤, Novo-Naprox Sodium ✤, Nu-Naprox ✤, Top Care All Day Pain Relief, Wal-Proxen

Func. class.: Nonsteroidal antiinflammatory, nonopioid analgesic

Chem. class.: Propionic acid derivative

Do not confuse:
Naprosyn/Natacyn/Naprelan

ACTION: Inhibits COX-1, COX-2 by blocking arachidonate; analgesic, antiinflammatory, antipyretic

USES: Osteoarthritis; rheumatoid, gouty arthritis; primary dysmenorrhea; ankylosing spondylitis, bursitis, tendinitis, myalgia, dental pain
Unlabeled uses: Juvenile rheumatoid arthritis, bone pain, migraine/migraine prophylaxis, heterotropic ossification

CONTRAINDICATIONS: Pregnancy (D) 3rd trimester, hypersensitivity to NSAIDs, salicylates; asthma, severe renal/hepatic disease, ulcer disease

Black Box Warning: Perioperative pain in CABG surgery

Precautions: Pregnancy (C) breastfeeding, children <2 yr, geriatric patients, bleeding disorders, GI disorders, cardiac disorders, hypersensitivity to other antiinflammatory agents, CCr <30 ml/min

Black Box Warning: MI, GI bleeding, stroke

DOSAGE AND ROUTES

200 mg base = 220 mg naproxen sodium

Antiinflammatory/analgesic/antidysmenorrheal
• **Adult: PO** 250-500 mg bid, max 1500 mg/day; **DEL REL** 375-500 mg bid
• **Child ≥2 yr: PO** 5-7 mg/kg q8-12hr

Antigout
• **Adult: PO** 750 mg, then 250 mg q8hr

OTC use
• **Adult: PO** 220 mg q8-12hr or 440 mg then 220 mg q12hr; max 660 mg/24hr taken ≤10 days
• **Geriatric >65 yr: PO** Max 220 mg q12hr

Available forms: Naproxen: tabs 250, 375, 500 mg; del rel tabs (EC-Naprosyn, Naprosyn-E) 250 ✤, 375, 500 mg; oral susp 125 mg/5 ml; ext rel tabs (CR) 375, 500, 750 mg; **naproxen sodium:** tabs 220, 275, 550 mg tab, ext rel 220 mg

Administer:
• With food to decrease GI symptoms; take on empty stomach to facilitate absorption, give with full glass of liquid
• Do not crush, break, or chew ext rel tabs
• OTC for ≤10 days unless approved by prescriber
• **Oral susp:** shake well, use measuring cup provided or other calibrated device

SIDE EFFECTS

CNS: Dizziness, drowsiness, fatigue, tremors, confusion, insomnia, anxiety, depression
CV: Tachycardia, peripheral edema, palpitations, dysrhythmias, MI, stroke
EENT: Tinnitus, hearing loss, blurred vision
GI: Nausea, anorexia, vomiting, diarrhea, jaundice, hepatitis, constipation, flatulence, cramps, peptic ulcer, GI ulceration, bleeding, perforation
GU: Nephrotoxicity: dysuria, hematuria, oliguria, azotemia
HEMA: Blood dyscrasias
INTEG: Purpura, rash, pruritus, sweating
SYST: Anaphylaxis

PHARMACOKINETICS

PO: Peak 2-4 hr, half-life 12-17 hr; metabolized in liver; excreted in urine (metabolites), breast milk; 99% protein binding

INTERACTIONS

Increase: renal impairment—ACE inhibitors
Increase: toxicity risk—methotrexate, lithium, antineoplastics, probenecid, radiation treatment
Increase: bleeding risk—oral anticoagulants, thrombolytic agents, eptifibatide, tirofiban, cefamandole, cefotetan, cefoperazone, clopidogrel, ticlopidine, plicamycin, SSRIs, SNRIs, tricyclics, valproic acid
Increase: GI side effects risk—aspirin, corticosteroids, alcohol, NSAIDs
Decrease: effect of antihypertensives, diuretics
Decreased: absorption of naproxen—antacids, sucralfate, cholestyramine
Drug/Herb
• Bleeding risk: feverfew, garlic, ginger, ginkgo, ginseng *(Panax)*
Drug/Lab Test
Increase: BUN, alk phos, LFTs, potassium, glucose, cholesterol
Decrease: potassium, sodium
False increase: 5-HIAA, 17KS

NURSING CONSIDERATIONS

Assess:
Black Box Warning: Cardiac status: CV thrombotic events, MI, stroke; may be fatal; not to be used with CABG

Black Box Warning: GI status: ulceration, bleeding, perforation; may be fatal; obtain stool guaiac

• **Pain:** frequency, characteristics, intensity; relief before and 1-2 hr after product
• **Arthritis:** range of motion, pain, swelling before and 1-2 hr after use
• **Fever:** before, 1 hr after use
Asthma, aspirin hypersensitivity or nasal polyps, increased risk of hypersensitivity
• **Renal, hepatic, blood studies:** BUN, creatinine, AST, ALT, Hgb, LDH, blood glucose, Hct, WBC, platelets, CCr before treatment, periodically thereafter during long-term therapy
• Audiometric, ophthalmic exam before, during, after treatment; if taking long term, eye, ear problems: blurred vision, tinnitus (may indicate toxicity)
Perform/provide:
• Storage at room temp
Evaluate:
• Therapeutic response: decreased pain, stiffness, swelling in joints; ability to move more easily
Teach patient/family:
• To report blurred vision, ringing, roaring in ears (may indicate toxicity)

- To avoid driving, other hazardous activities if dizziness or drowsiness occurs
- ⚠ To report change in urine pattern, weight increase, edema (face, lower extremities), pain increase in joints, fever, blood in urine (indicates nephrotoxicity); black stools, flulike symptoms
- That therapeutic effects may take up to 1 mo in arthritis
- To avoid ASA, alcohol, steroids or other OTC medications without prescriber approval
- To report use to all health care providers
- To notify prescriber if pregnancy is planned or suspected, pregnancy (C), avoid breastfeeding

naratriptan (Rx)

(nair'ah-trip-tan)

Amerge

Func. class.: Antimigraine agent

Chem. class.: 5-HT_1 receptor agonist

Do not confuse:
Amerge/Altace/Amaryl

ACTION

Binds selectively to the vascular 5-HT_1 B/D receptor subtype, exerts antimigraine effect; causes vasoconstriction in cranial arteries

USES

Acute treatment of migraine with/without aura

CONTRAINDICATIONS

Hypersensitivity, angina pectoris, history of MI, documented silent ischemia, ischemic heart disease, concurrent ergotamine-containing preparations, uncontrolled hypertension, CV syndromes, hemiplegic or basilar migraines, severe renal disease (CCr <15 ml/min); severe hepatic disease (Child-Pugh grade C)

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, postmenopausal women, men >40 yr, CAD risk, hypercholesterolemia, obesity, diabetes, impaired renal/hepatic function, peripheral vascular disease overuse

DOSAGE AND ROUTES

- **Adult: PO** 1 or 2.5 mg with fluids; if headache returns, repeat 1× after 4 hr; max 5 mg/24 hr

Hepatic/renal dose

- **Adult: PO** CCr 15-39 ml/min, or mild-moderate hepatic disease max 2.5 mg/24 hr

Available forms: Tabs 1, 2.5 mg

Administer:

- With fluids as soon as symptoms appear; may take another dose after 4 hr; do not take >5 mg during any 24-hr period

SIDE EFFECTS

CNS: Dizziness, sedation, fatigue

CV: Increased B/P, palpitations, tachydysrhythmias, PR, QTc prolongation, ST/T wave changes, PVCs, atrial flutter/fibrillation, coronary vasospasm

EENT: EENT infections, photophobia

GI: *Nausea, vomiting*

MISC: Temperature change sensations; tightness, pressure sensations

MS: *Weakness, neck stiffness,* myalgia

PHARMACOKINETICS

Onset 2-3 hr; peak 2-3 hr; 28%-31% protein binding; half-life 6 hr; metabolized in liver (metabolite); excreted in urine, feces; may be excreted in breast milk

INTERACTIONS

Increase: serotonin syndrome, neuroleptic malignant syndrome—SSRIs (FLUoxetine, fluvoxaMINE, PARoxetine, sertraline), SNRIs, serotonin receptor agonists, sibutramine

Increase: vasospastic effects—ergot, ergot derivatives, other 5-HT_1 agonists

Increase: adverse reactions risk—MAOIs; do not use together

Drug/Herb

- Serotonin syndrome: SAM-e, St. John's wort

NURSING CONSIDERATIONS

Assess:

• **Migraine symptoms:** aura, duration, effect on lifestyle, aggravating/alleviating factors

⚠ **Serotonin syndrome, neuroleptic malignant syndrome:** increased heart rate, shivering sweating, dilated pupils, tremors, high B/P, hyperthermia, headache, confusion; if these occur, stop product, administer serotonin antagonist if needed; at least 2 wk should elapse between discontinuation of serotonergic agents and start of product

⚠ Cardiac status: ECG, increased B/P, dysrhythmias, monitor for PR, QT prolongation, ST-T wave changes, PVCs in those with cardiac disease

• Stress level, activity, recreation, coping mechanisms

• Neurologic status: LOC blurred vision, nausea, vomiting, tingling in extremities preceding headache

Perform/provide:

• Quiet, calm environment with decreased stimulation (noise, bright light, excessive talking)

Evaluate:

• Therapeutic response: decrease in frequency, severity of headache

Teach patient/family:

⚠ To report pain, tightness in chest, neck, throat, or jaw; to notify prescriber immediately if sudden, severe abdominal pain occurs

• Not to use if another 5-HT_1 agonist or ergot preparation has been used during past 24 hr; to avoid using >2 days/wk because rebound headache may occur

• To notify prescriber if pregnancy is planned or suspected; to avoid breastfeeding

natalizumab (Rx)

(na-ta-liz'u-mab)

Tysabri

Func. class.: Biologic response modifier, immunoglobulins, monoclonal antibody

ACTION: Biologic-response-modifying properties mediated through specific receptors on cells, may be secondary to blockade of the interaction of inflammatory cells with vascular endothelial cells

USES: Ambulatory patients with relapsing/remitting MS who have not responded to other treatment; those with moderate to severe Crohn's disease

CONTRAINDICATIONS: Hypersensitivity, immunocompromised individuals (HIV, AIDS, leukemia, lymphoma, transplants), PML, murine (mouse) protein allergy

Black Box Warning: Progressive multifocal leukoencephalopathy

Precautions: Pregnancy (C), breastfeeding, geriatric patients, chronic progressive MS, depression, mental disorders, diabetes, TB, active infections, hepatotoxicity

DOSAGE AND ROUTES

• **Adult: IV INF** 300 mg q4wk; give over 1 hr; observe during and for 1 hr after inf

• **Adolescent and child ≥11 yr (unlabeled): IV INF** pediatric Crohn's disease activity index (PCDAI) >30, 3 mg/kg q4wk

Available forms: Single-use vial, 300 mg/100 ml 0.9% NaCl

Administer:

• Acetaminophen for fever, headache

• Only after being enrolled in the TOUCH Prescribing Program

Intermittent IV INF route

• Use only clear, colorless solution, without particulates

• Withdraw 15 ml from the vial using aseptic technique: inj conc into 100 ml 0.9% NaCl; do not use other diluents; mix completely; do not shake; inf immediately or refrigerate for ≤8 hr; warm to room temp before using; flush with 0.9% NaCl before, after inf; do not admix or use in same line with other agents
• Withhold product at first sign of PML
• Prescribers must be registered in the TOUCH prescribing program (1-800-456-2255)

SIDE EFFECTS

CNS: *Headache, fatigue,* rigors, syncope, tremors, *depression,* progressive multifocal leukoencephalopathy (PML), suicidal ideation, anxiety
CV: Chest discomfort, hypo/hypertension, tachycardia
GI: *Abdominal discomfort,* abnormal LFT, gastroentritis, severe hepatic injury
GU: Amenorrhea, *UTI, irregular menses,* vaginitis, urinary frequency
INTEG: *Rash,* dermatitis, pruritus, skin melanoma, infusion-related reactions
MS: *Arthralgia,* myalgia
RESP: *Lower respiratory tract infection,* dyspnea
SYST: Anaphylaxis, angioedema

PHARMACOKINETICS

Half-life approximately 11 days

INTERACTIONS

• Do not use with vaccines
Increase: infection—immunosuppressants, antineoplastics, immunomodulators, tumor necrosis factors

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Progressive multifocal leukoencephalopathy (weakness, paralysis, vision loss, impaired speech, cognitive deterioration; obtain gadolinium-enhanced MRI scan of the brain, possibly cerebrospinal fluid for JC viral DNA; signs, symptoms of PML (decreased cognition, vision; ataxia, dysphagia), incidences increase with number of doses, over 2 yr immunosuppressants and anti-JC virus antibody; consider testing for the anti-JC virus and periodically retest

• **Infection:** report serious opportunistic infections to the manufacturer; those with Crohn's disease and chronic oral corticosteroids may be at greater risk of infection
• Blood, renal, hepatic studies: CBC, differential, platelet counts, BUN, creatinine, ALT, urinalysis, antibody testing
• CNS symptoms: headache, fatigue, depression, rigors, tremors
• GI status: abdominal discomfort, gastroenteritis, severe hepatic injury, abnormal LFTs
• Mental status: depression, depersonalization, suicidal thoughts, insomnia
• **MS symptoms;** product should only be used by patients who have not responded to other treatments
⚠ **Anaphylaxis:** SOB, hives; swelling, tightness in throat, chest pain; usually within 2 hr of inf

Perform/provide:

• Storage of sol in refrigerator; do not freeze or shake; protect from light; use within 8 hr of preparation

Evaluate:

• Therapeutic response: decreased symptoms of MS, Crohn's disease

Teach patient/family:

• Provide patient or family member with written, detailed information about product (med guide)
• That female patients may experience irregular menses, amenorrhea, may worsen over several days; to notify prescriber if pregnancy is suspected; to avoid breastfeeding while taking this product, if pregnant, call the Tysabri Pregnancy Exposure Registry (1-800-456-2255)
⚠ To notify prescriber of possible infection: sore throat, cough, increased temp, inf site reactions

N

- That continuing follow-up will be needed at 3, 6 months after first dose, then every 6 months
- To inform all prescribers of product use

natamycin ophthalmic

See Appendix B

nebivolol (Rx)

(ne-biv′oh-lol)

Bystolic

Func. class.: Antihypertensive

Chem. class.: β_1-blocker

ACTION: Competitively blocks stimulation of β-adrenergic receptors within vascular smooth muscle; decreases rate of SA node discharge, increases recovery time, slows conduction of AV node, thereby resulting in decreased heart rate (negative chronotropic effect), which decreases O_2 consumption in myocardium due to β_1-receptor antagonism; decreases renin-aldosterone-angiotensin system at high doses, inhibits β_2-receptors in bronchial system at high doses

USES: Hypertension alone or in combination

Unlabeled uses: Heart failure

CONTRAINDICATIONS: Cardiogenic shock, heart failure, severe hepatic disease, severe bradycardia, sick sinus syndrome, AV heart block; hypersensitivity to product, β-blockers

Precautions: Pregnancy (C), breastfeeding, children, major surgery, peripheral vascular disease, diabetes mellitus, thyrotoxicosis disease, COPD, asthma, well-compensated heart failure, renal/hepatic disease, abrupt discontinuation, acute bronchospasm

DOSAGE AND ROUTES

Hypertension

- **Adult: PO** 5 mg/day, may be increased to desired response q2wk; max 40 mg/day
- **Geriatric: PO** max 40 mg/day

Renal/hepatic dose

- **Adult: PO** CCr <30 ml/min, 2.5 mg/day; may increase cautiously; (Child-Pugh class B) 2.5 mg daily, use dose escalation cautiously

Heart failure (unlabeled)

- **Adult: PO** 1.25 mg titrated to max 10 mg/day

Available forms: Tabs 2.5, 5, 10, 20 mg

Administer:

PO route

- Without regard to meals; tab may be crushed or swallowed whole; give with food to prevent GI upset

SIDE EFFECTS

CNS: *Insomnia, fatigue, dizziness, mental changes,* drowsiness, headache

CV: Bradycardia, MI, AV heart block, edema

GI: *Nausea, diarrhea,* vomiting, abdominal pain

GU: *Impotence*

HEMA: Thrombocytopenia

INTEG: Rash, pruritus, vasculitis, urticaria, psoriasis, angioedema

MISC: Renal failure, pulmonary edema, hyperuricemia, hypercholesterolemia

RESP: Bronchospasm, dyspnea

PHARMACOKINETICS

Peak 1.5-4 hr; half-life 12 hr; metabolized in liver by CYP2D6; 38% excreted in urine, 44% in feces

INTERACTIONS

⚠ Do not give with other β-blockers, mefloquine

Increase: nebivolol action—CYP2D6 inhibitors (amiodarone, buPROPion, chloroquine, chlorpheniramine, chlorproMAZINE, cinacalcet, diphenhydrAMINE, DULoxetine, FLUoxetine, haloperidol, imatinib, PARoxetine, promethazine,

propoxyphene, quiNIDine, quiNINE, ritonavir, terbinafine, thioridazine), cimetidine, calcium channel blockers (nondihydropyridine)
Decrease: nebivolol action—CYP2D6 inducers (rifampin), sildenafil

Drug/Herb
- May increase nebivolol effect—hawthorn
- May decrease nebivolol effect—ephedra

Drug/Lab Test
Increase: serum lipoprotein levels, BUN, potassium, triglycerides, uric acid, LDH, AST, ALT, alk phos
Decrease: platelets

NURSING CONSIDERATIONS

Assess:
- **Hypertension:** B/P during beginning treatment, periodically thereafter; apical/radial pulse before administration; notify prescriber of any significant changes (pulse <50 bpm); **signs of CHF** (dyspnea, crackles, weight gain, jugular venous distention)
- Baselines of renal, hepatic function tests before therapy begins and periodically, do not use in Child-Pugh class >B
- Edema in feet, legs daily: monitor I&O

Perform/provide:
- Storage protected from light, moisture; place in cool environment

Evaluate:
- Therapeutic response: decreased B/P after 1-2 wk; decreased dysrhythmias

Teach patient/family:
⚠ Not to discontinue product abruptly because severe cardiac reactions may occur, to taper over 2 wk; not to double dose; if dose is missed, to take as soon as remembered up to 4 hr before next dose
- That product may mask signs of hypoglycemia or alter blood glucose levels
- Not to use OTC products containing α-adrenergic stimulants (nasal decongestants, OTC cold preparations) unless directed by prescriber
- To report low pulse, dizziness, confusion, depression, fever
- To take pulse, B/P at home; advise patient when to notify prescriber
- To comply with weight control, dietary adjustments, modified exercise program
- To carry emergency ID to identify product, allergies
- To avoid hazardous activities if dizziness, drowsiness present
- **To report symptoms of CHF:** difficulty breathing, especially on exertion or when lying down, night cough, swelling of extremities
- To continue with required lifestyle changes (exercise, diet, weight loss, stress reduction)

TREATMENT OF OVERDOSE:
Lavage, IV atropine for bradycardia, IV theophylline for bronchospasm, digoxin, O_2, diuretic for cardiac failure, IV glucose for hypoglycemia, IV diazepam (or phenytoin) for seizures, IV fluids, IV pressors

N

nelfinavir (Rx)
(nell-fin'a-ver)
Viracept
Func. class.: Antiretroviral
Chem. class.: Protease inhibitor

ACTION: Inhibits human immunodeficiency virus (HIV-1) protease, which prevents maturation of the infectious virus
Uses: HIV-1 in combination with other antiretrovirals

CONTRAINDICATIONS: Hypersensitivity to protease inhibitors
Precautions: Pregnancy (B), breastfeeding, renal/hepatic disease, hemophilia, PKU, pancreatitis, diabetes, infection, immune reconstitution syndrome

DOSAGE AND ROUTES

HIV infection
- **Adult and child >13 yr: PO** 750 mg tid or 1250 mg bid

• **Child 2-13 yr: PO** 25-35 mg/kg tid, max 2500 mg/day

Prevention of HIV infection after exposure (unlabeled)

• **Adult: PO** 1250 mg bid with 2 other antiretroviral agents × 4 wk

Available forms: Tabs 250, 625 mg; powder, oral 50 mg/g/scoop

Administer:

PO route

• Do not mix with juice or acidic fluids

• **Oral powder:** mixed with fluids if desired; stable mixed for 6 hr, may use in child unable to take tabs, do not mix with water in original bottle

• **Tabs** may be crushed and dispersed in water or mixed with food; consume immediately

SIDE EFFECTS

CNS: Headache, asthenia, poor concentration, seizures, suicidal ideation

CV: Bleeding

ENDO: Hyperglycemia, hyperlipidemia

GI: *Diarrhea,* anorexia, dyspepsia, *nausea, flatulence,* hepatitis, pancreatitis

HEMA: Anemia, leukopenia, thrombocytopenia, Hgb abnormalities

INTEG: *Rash,* dermatitis, anaphylaxis

MS: Pain, arthralgia, myalgia, myopathy

Other: Hypoglycemia, redistribution/accumulation of body fat, immune reconstitution syndrome

PHARMACOKINETICS

Half-life 3½-5 hr, excreted in feces (87%), peak 2-4 hr, 98% protein binding; metabolized by CYP3A4 enzyme system; potent inhibitor of CYP3A4

INTERACTIONS

Drug/Herb

⚠ **Increase:** serious dysrhythmias: amiodarone, ergots, lovastatin, midazolam, pimozide, quiNIDine, simvastatin, triazolam, salmeterol

Increase: effect of—atorvastatin, azithromycin, rifabutin, indinavir, saquinavir, cycloSPORINE, tacrolimus, sirolimus, sildenafil, alfentanil, alosetron, buprenorphine, busPIRone, bortezomib, calcium channel blockers, cilostazol, disopyramide, dofetilide, DOCEtaxel, donepezil, ethosuximide, fentaNYL, galantamine, gefitinib, levomethadyl, systemic lidocaine, PACLitaxel, sibutramine, SUFentanil, vinca alkaloids, ziprasidone, zonisamide, traZODone, tricyclic antidepressants, sildenafil

Increase: nelfinavir levels—ketoconazole, indinavir, ritonavir; delavirdine, other HIV protease inhibitors

Decrease: nelfinavir levels—rifamycins, nevirapine, PHENobarbital, phenytoin, carBAMazepine

Decrease: effect of—didanosine, methadone, oral contraceptives, phenytoin

Drug/Herb

⚠ **Decrease:** antiretroviral effect—St. John's wort; do not use concurrently

Drug/Food

Increase: absorption with food

Drug/Lab Test

Increase: AST, ALT, alk phos, total bilirubin, CPK, LDH, lipids, uric acid

Decrease: WBC, platelets

NURSING CONSIDERATIONS

Assess:

• Resistance testing at initiation, with failure of treatment

• Signs of infection, anemia

• Hepatic studies: ALT, AST

• Bowel pattern before, during treatment; if severe abdominal pain with bleeding occurs, product should be discontinued; monitor hydration

⚠ **Immune reconstitution syndrome:** occurs with combination therapy, including MAC, CMV, PCP TB requiring treatment

⚠ **Anaphylaxis, hypersensitivity reaction:** wheezing, flushing; swelling of lips, tongue, throat, skin eruptions, rash, urticaria, itching

• **HIV:** serum lipid profile, plasma HIV RNA, blood glucose, viral load, CD4 cell counts at baseline and throughout treatment

Teach patient/family:
- To avoid taking with other medications unless directed by prescriber
- **Diarrhea** is most common side effect, may use loperamide to control
- That product does not cure but does manage symptoms; that product does not prevent transmission of HIV to others
- To use a nonhormonal form of birth control while taking this product if using contraceptives
- If dose is missed, to take as soon as remembered up to 1 hr before next dose; not to double dose
- To take with food
- To report symptoms of hyperglycemia, bleeding, abdominal pain; yellowing of skin, eyes
- **Phenylketonuria:** powder contains phenylalanine

RARELY USED

neomycin (Rx)
(nee-oh-mye'sin)
Func. class.: Antiinfective

USES: Severe systemic infections of CNS, respiratory, GI, urinary tract, eye, bone, skin, soft tissues caused by *Pseudomonas aeruginosa, Escherichia coli, Enterobacter, Klebsiella pneumoniae, Proteus vulgaris;* hepatic coma, preoperatively to sterilize bowel, infectious diarrhea caused by enteropathogenic *E. coli*

CONTRAINDICATIONS: Infants, children, bowel obstruction (oral use), severe renal disease, hypersensitivity, GI disease

Precautions:

Black Box Warning: Dehydration, geriatric patients, hearing impairment, neuromuscular disease, renal disease, respiratory insufficiency

DOSAGE AND ROUTES

Hepatic encephalopathy
- **Adult: PO** 4-12 g/day in divided doses q6hr × 5-6 days
- **Child: PO** 50-100 mg/kg/day in divided doses q6hr × 5-6 days

Preoperative intestinal antisepsis
- **Adult: PO** 1 g/hr × 4 hr then 1 g q4hr for remaining 24 hr

neomycin topical
See Appendix B

nepafenac ophthalmic
See Appendix B

⚠ HIGH ALERT

nesiritide (Rx)
(neh-seer'ih-tide)
Natrecor
Func. class.: Vasodilator
Chem. class.: Human B-type natriuretic peptide

ACTION: Uses DNA technology; human B-type natriuretic peptide binds to the receptor in vascular smooth muscle and endothelial cells, thereby leading to smooth muscle relaxation

USES: Acutely decompensated CHF

CONTRAINDICATIONS: Hypersensitivity to this product or *Escherichia coli* protein; cardiogenic shock or B/P <90 mm Hg as primary therapy

Precautions: Pregnancy (C); breastfeeding; children; mitral stenosis; significant valvular stenosis, restriction, or obstructive cardiomyopathy, or any condition dependent on venous return; renal disease; constrictive pericarditis

DOSAGE AND ROUTES

• **Adult: IV BOL** 2 mcg/kg then **CONT IV INF** 0.01 mcg/kg/min

Available forms: Powder for inj, 1.5-mg single-use vial

Administer:

IV route

• Do not give through a central catheter containing other products; administer other products through separate catheter or central line heparin-coated catheter because nesiritide binds to heparin

• Reconstitute one 1.5-mg vial/5 ml of diluent from prefilled 250-ml plastic IV bag with diluent of choice (preservative free D_5, 0.9% NaCl, D_5/$^1/_2$ NaCl, D_5/0.2% NaCl); do not shake vial, roll gently; use only clear sol

• Withdraw all contents of reconstituted vial and add to 250-ml plastic IV bag (6 mcg/ml), invert bag several times

• Use within 24 hr of reconstituting

• Prime IV fluid with inf of 5 ml before connecting to patient's vascular access port and before bolus dose or IV inf

Direct IV route

• Prime tubing with 5 ml inf sol; calculate dose based on patient's weight, 0.33 × patient weight (kg) = bolus vol (ml) (6 mcg/ml); withdraw prescribed bolus dose (volume) from prepared inf bag; give over 1 min through IV port

Intermittent IV INF route

• After bolus dose, use inf, give at 0.1 ml/kg/hr (0.01 mcg/kg/min)

Y-site compatibilities: Acyclovir, alfentanil, allopurinol, amifostine, aminocaproic acid, aminophylline, amiodarone, amphotericin B colloidal, amphotericin B lipid complex, amphotericin B liposome, anidulafungin, argatroban, atenolol, atracurium, azithromycin, aztreonam, bivalirudin, bleomycin, buprenorphine, busulfan, butorphanol, calcium acetate/chloride/gluconate, CARBOplatin, carmustine, ceFAZolin, cefotaxime, cefoTEtan, cefOXitin, ceftAZidime, ceftizoxime, ceftRIAXone, cefuroxime, chloramphenicol, cimetidine, ciprofloxacin, cisatracurium, CISplatin, clindamycin, cyclophosphamide, cycloSPORINE, cytarabine, dacarbazine, DACTINomycin, DAUNOrubicin, digoxin, diltiazem, diphenhydrAMINE, DOCEtaxel, dolasetron, doxacurium, DOXOrubicin, doxycycline, droperidol, ePHEDrine, epirubicin, ertapenem, erythromycin, esmolol, etoposide, etoposide phosphate, famotidine, fenoldopam, fentaNYL, filgrastim, fluconazole, fludarabine, fluorouracil, foscarnet, fosphenytoin, ganciclovir, gatifloxacin, gemcitabine, gemtuzumab, glycopyrrolate, granisetron, haloperidol, hydrocortisone, HYDROmorphone, hydrOXYzine, IDArubicin, ifosfamide, imipenem-cilastatin, irinotecan, ketorolac, leucovorin, levofloxacin, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, melphalan, meropenem, mesna, metaraminol, methohexital, methotrexate, methylPREDNISolone, metoclopramide, metroNIDAZOLE, midazolam, milrinone, minocycline, mitoMYcin, mitoXANtrone, mivacurium, moxifloxacin, mycophenolate, nalbuphine, naloxone, niCARdipine, nitroglycerin, nitroprusside, octreotide, ondansetron, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pamidronate, pancuronium, PEMEtrexed, pentamidine, PENTobarbital, PHENobarbital, phentolamine, phenylephrine, polymyxin B sulfate, potassium chloride/phosphates, prochlorperazine, propranolol, quiNIDine, quinupristin-dalfopristin, ranitidine, remifentanil, rocuronium, sodium acetate/bicarbonate/phosphates, streptozocin, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiotepa, ticarcillin, tigecycline, tirofiban, tolazoline, topotecan, torsemide, trimethobenzamide, vancomycin, vasopressin, vecuronium, verapamil, vinBLAStine, vinCRIStine, vinorelbine, zidovudine, zoledronic acid

SIDE EFFECTS

CNS: Headache, insomnia, dizziness, anxiety, confusion, paresthesia, tremor

CV: *Hypotension,* tachycardia, dysrhythmias, bradycardia, ventricular tachycardia, ventricular extrasystoles, atrial fibrillation
GI: Vomiting, nausea
INTEG: Rash, sweating, pruritus, inj site reaction
MISC: Abdominal pain, back pain
RESP: Increased cough, hemoptysis, apnea

PHARMACOKINETICS

Half-life 18 min

INTERACTIONS

Increase: hypotension—ACE inhibitors, antihypertensives, inotropes, IV nitrates

NURSING CONSIDERATIONS

Assess:
- PCWP, RAP, cardiac index, MPAP, B/P, pulse during treatment until stable
- Daily serum creatinine, BUN
- **CHF:** weight gain, dyspnea, crackles, I&O ratios, peripheral edema

Evaluate:
- Therapeutic response: improvement in CHF with improved PCWP, RAP, MPAP

Teach patient/family:
- About purpose of medication, expected results, to report pain at IV site
- To report dizziness, blurred vision, lightheadedness, sweating

nevirapine (Rx)

(ne-veer'a-peen)
Viramune, Viramune XR
Func. class.: Antiretroviral
Chem. class.: Nonnucleoside reverse transcriptase inhibitor (NNRTI)

Do not confuse:
nevirapine/nelfinavir
Viramune/Viracept

ACTION

Binds directly to reverse transcriptase and blocks RNA, DNA, thus causing a disruption of the enzyme's site

USES

HIV-1 in combination with other highly active antiretroviral therapy (HAART)

CONTRAINDICATIONS

Black Box Warning: Hypersensitivity, hepatic disease

Precautions: Pregnancy (B), breastfeeding, children, renal disease, Hispanic patients

Black Box Warning: Females, hepatitis

DOSAGE AND ROUTES

Treatment of HIV infection in combination with other antiretrovirals

- **Adult and adolescent: PO** 200 mg/day × 2 wk then 200 mg bid in combination; **EXT REL** tab (adults not currently taking immediate rel nevirapine) 200 mg/day (immediate rel tab) × 14 days with other antiretrovirals; if rash develops during lead-in periods and persists beyond 14 days, do not use ext rel tab; if no consistent rash present, then give 400 mg/day ext rel tab with other antiretrovirals; if interrupted >7 days, restart 14 day lead-in dosing; for adults switched from immediate rel tab, give 400 mg/day ext rel tab
- **Child/adolescent ≥6 yr: PO EXT REL** not currently taking immediate release 150 mg/m^2 (immediate release) daily (max 200 mg/day) × 14 days then BSA 0.58-0.83 m^2 200 mg/day; BSA 0.84-1.16 m^2 300 mg/day
- **Child/infant/neonate ≥15 days old: PO** 150 mg/m^2/day × 14 days then 150 mg/m^2 bid, max 400 mg/day

Perinatal transmission prophylaxis (unlabeled)

- **Females with no previous antiretroviral therapy: PO** 200 mg as a single dose at onset of labor with zidovudine 2 mg/kg over 1 hr followed by zidovudine 1 mg/kg/hr until delivery
- **Neonate ≥34 wk gestation: PO** Nevirapine 12 mg (>2 kg) or 8 mg (1.5-2 kg) × 3 doses; 1st dose 48 hr after birth, 2nd dose 48 hr after 1st dose, 3rd dose 96 hr after 2nd dose and **PO** zidovudine

N

Hepatic Dose

• **Adult: PO** Do not use with Child-Pugh grade B or C

Available forms: Tabs 200 mg; oral susp 50 mg/5 ml; ext rel 400 mg

Administer:

• Do not initiate treatment in females when CD4 counts >250 cells/mm^3 or in males when >400 cells/mm^3 unless benefits outweigh risks

• Without regard to meals

• Use in combination with at least 1 other antiretroviral

• **Oral susp** should be shaken before giving

SIDE EFFECTS

CNS: *Paresthesia, headache, fever, peripheral neuropathy*

GI: *Diarrhea,* abdominal pain, *nausea, stomatitis,* hepatotoxicity, hepatic failure

HEMA: Neutropenia, anemia, thrombocytopenia

INTEG: *Rash,* toxic epidermal necrolysis

MISC: Stevens-Johnson syndrome, anaphylaxis

MS: Pain, myalgia, rhabdomyolysis

PHARMACOKINETICS

Rapidly absorbed, peak 4 hr, 60% bound to plasma proteins, metabolized by liver; metabolized by hepatic P450 enzyme system, excreted 91% in urine, terminal half-life 25-30 hr, 50% removed by peritoneal dialysis; with hepatic disease and in Hispanic patients, African American patients, slower rate of clearance

INTERACTIONS

Increase: nevirapine levels—cimetidine, macrolide antiinfectives

Decrease: effects of protease inhibitors, oral contraceptives, ketoconazole, methadone, itraconazole

Decrease: nevirapine levels—rifamycins, anticonvulsants, clonazePAM, diazepam, warfarin

Drug/Herb

Decrease: action of antiretroviral—St. John's wort; do not use concurrently

Drug/Lab Test

Increase: ALT, AST, GGT, bilirubin, Hgb

Decrease: neutrophil count

NURSING CONSIDERATIONS

Assess:

• Resistance testing before therapy and when therapy fails

⚠ Signs of infection, anemia, hepatotoxicity, immune reconstitution syndrome; hepatitis B or C, liver toxicity may occur

• **HIV:** blood studies during treatment: ALT, AST, viral load, CD4, plasma HIV RNA, renal studies; if LFTs elevated significantly, product should be withheld; glucose levels in diabetic patients, if treatment is interrupted by >1 wk, restart at initial dose

⚠ **Rhabdomyolysis:** pain, tenderness, weakness, edema; product should be discontinued

• Bowel pattern before, during treatment; if severe abdominal pain with bleeding occurs, product should be discontinued; monitor hydration

⚠ **Stevens-Johnson syndrome, toxic epidermal necrolysis,** allergies before treatment, reaction to each medication; skin eruptions; rash, urticaria, itching; if rash is severe or systemic symptoms occur, discontinue immediately

Evaluate:

• Therapeutic response: absence of AIDS-defining symptoms, improvement in quality of life; decreased viral load, increase in CD4 count

Teach patient/family:

⚠ To report any right quadrant pain, yellowing of eyes or skin, dark urine, nausea, anorexia, muscle pain or tenderness, rash immediately

• That product may be taken with food, antacids

• To take as prescribed; if dose is missed, to take as soon as remembered up to 1 hr before next dose; not to double dose

• That product is not a cure, does not prevent transmission; controls symptoms of HIV

- To avoid OTC agents unless approved by prescriber
- To use a nonhormonal form of contraception during treatment in those using contraceptives

niacin (OTC, Rx)
(nye'a-sin)
Equaline Niacin, Niaspan, Ni-Odan ✤, Slo-Niacin
niacinamide (OTC, Rx)
Func. class.: Vit B_3, antihyperlipidemic
Chem. class.: Water-soluble vitamin

ACTION: Needed for conversion of fats, protein, carbohydrates by oxidation reduction; acts directly on vascular smooth muscle, thus causing vasodilation; reduces total cholesterol, LDL, VLDL, triglycerides; increases HDL

USES: Pellagra, hyperlipidemias (types 4, 5), peripheral vascular disease that presents a risk for pancreatitis

CONTRAINDICATIONS: Breastfeeding, hypersensitivity, peptic ulcer, hepatic disease, hemorrhage, severe hypotension
Precautions: Pregnancy (C), breastfeeding, glaucoma, cardiovascular disease, CAD, diabetes mellitus, gout, schizophrenia

DOSAGE AND ROUTES

Niacin deficiency
- **Adult: PO** 100-500 mg/day in divided doses; **IM/SUBCUT** 5-100 mg ≥5×/day; **IV** 25-100 mg bid or tid
- **Child: PO** ≤300 mg/day in divided doses

Adjunct in hyperlipidemia
- **Adult: PO** 250 mg after evening meal; may increase dose at 1-4 wk intervals to 1-2 g tid, max 6 g/day; **EXT REL** 500 mg at bedtime × 4 wk then 1000 mg at bedtime for wk 5-8; do not increase by >500 mg q4wk, max 2000 mg/day

Pellagra
- **Adult: PO** 300-500 mg/day in divided doses; **IM** 50-100 mg 5×/day or **IV** 25-100 mg bid by slow **IV INF**
- **Child: PO** 100-300 mg/day in divided doses; **IV** ≤300 mg/day by slow **IV/INF**

Peripheral vascular disease
- **Adult: PO** 250-800 mg/day in 3-5 divided doses

Available forms: *Niacin:* tabs 50, 100, 250, 500, mg; ext rel caps 250, 500 mg; ext rel tab 250, 500, 750, 1000 mg; *niacinamide:* tab 100, 500 mg
Administer:
- Do not break, crush, or chew ext rel tabs, caps
- With meals for GI symptoms; with 81-325 mg aspirin or NSAIDs 30 min before dose to decrease flushing

SIDE EFFECTS

CNS: Paresthesias, headache, dizziness, anxiety
CV: Postural hypotension, vasovagal attacks, dysrhythmias, vasodilation
EENT: Blurred vision, ptosis
GI: Nausea, vomiting, anorexia, jaundice, hepatotoxicity, diarrhea, peptic ulcer, dyspepsia, hepatitis
GU: Hyperuricemia, glycosuria, hypoalbuminemia
INTEG: Flushing, dry skin, rash, pruritus, itching, tingling

PHARMACOKINETICS

PO: Peak 30-70 min (depends on formulation), half-life 45 min; metabolized in liver; 30% excreted unchanged in urine

INTERACTIONS

Increase: postural hypotension—ganglionic blockers
⚠ **Increase:** myopathy, rhabdomyolysis—HMG-CoA reductase inhibitors
Increase: flushing, pruritus—alcohol, avoid use
Drug/Herb
⚠ **Increase:** myopathy, rhabdomyolysis—red yeast rice

Drug/Lab Test
Increase: bilirubin, alk phos, hepatic enzymes, LDH, uric acid, glucose
Decrease: cholesterol
False increase: urinary catecholamines
False positive: urine glucose

NURSING CONSIDERATIONS

Assess:
- Cardiac status: rate, rhythm, quality; postural hypotension, dysrhythmias
- Nutritional status: liver, yeast, legumes, organ meat, lean poultry; fat in diet

⚠ **Hepatotoxicity:** clay-colored stools, itching, dark urine, jaundice; hepatic studies: AST, ALT, bilirubin, uric acid, alk phos; blood glucose before and during treatment

- CNS symptoms: headache, paresthesias, blurred vision
- **Niacin deficiency:** nausea, vomiting, anemia, poor memory, confusion, dermatitis
- **Hyperlipidemia:** for lipid, triglyceride, cholesterol level; obtain diet history

Evaluate:
- Therapeutic response: decreased lipids, warm extremities, absence of numbness in extremities

Teach patient/family:
- That flushing and increase in feelings of warmth will occur several hr after taking product (PO); after 2 wk of therapy, these side effects diminish
- To remain recumbent if postural hypotension occurs; to rise slowly to prevent orthostatic hypotension
- To abstain from alcohol if product is prescribed for hyperlipidemia
- To avoid sunlight if skin lesions are present

⚠ **Hepatotoxicity:** to report clay-colored stools, anorexia, yellow eyes or skin, dark urine

niCARdipine (Rx)

(nye-card'i-peen)
Cardene IV, Cardene SR
Func. class.: Calcium channel blocker, antianginal, antihypertensive
Chem. class.: Dihydropyridine

Do not confuse:
niCARdipine/NIFEdipine
Cardene/Cardizem
Cardene SR/Cardizem SR

ACTION: Inhibits calcium ion influx across cell membrane during cardiac depolarization; produces relaxation of coronary vascular smooth muscle, peripheral vascular smooth muscle; dilates coronary vascular arteries; increases myocardial oxygen delivery in patients with vasospastic angina

USES: Chronic stable angina pectoris, hypertension

CONTRAINDICATIONS: Sick sinus syndrome, 2nd-/3rd-degree heart block; hypersensitivity to this product or dihydropyridine; advanced aortic stenosis

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, CHF, hypotension, hepatic injury, renal disease

DOSAGE AND ROUTES

Hypertension
- **Adult: PO** 20 mg tid initially; may increase after 3 days (range 20-40 mg tid) or 30 mg bid **SUS REL;** may increase to 60 mg bid or **IV** 5 mg/hr; may increase by 2.5 mg/hr q15min; max 15 mg/hr

Angina
- **Adult: PO** 20 mg tid; may be adjusted q3days; may use 20-40 mg tid

Renal dose
- **Adult: PO** adjust based on response

Hepatic dose
- **Adult: PO** 20 mg bid

Available forms: Caps 20, 30 mg; sus rel caps 30, 45, 60 mg; inj 2.5 mg/ml, premixed 20 mg/200 ml, 40 mg/200 ml

Administer:

PO route

- Do not break, crush, chew, or open sus rel cap
- Without regard to meals

IV route

- Dilute each 25 mg/240 ml of compatible sol (0.1 mg/ml), give slowly, titrate to patient response, change IV site q12hr
- Stable at room temp for 24 hr

Solution compatibilities: D_5W, D_5/0.45% NaCl, D_5/0.9% NaCl

Y-site compatibilities: Alemtuzumab, amikacin, aminophylline, aztreonam, bivalirudin, butorphanol, calcium gluconate, CARBOplatin, caspofungin, ceFAZolin, ceftizoxime, chloramphenicol, cimetidine, CISplatin, clindamycin, cytarabine, DAPTOmycin, dexmedetomidine, diltiazem, DOBUTamine, DOCEtaxel, DOPamine, DOXOrubicin hydrochloride, enalaprilat, EPINEPHrine, epirubicin, erythromycin, esmolol, famotidine, fenoldopam, fentaNYL, gentamicin, hydrocortisone, HYDROmorphone, labetalol, lidocaine, linezolid, LORazepam, magnesium sulfate, mechlorethamine, methylPREDNISolone, metroNIDAZOLE, midazolam, milrinone, morphine, nafcillin, nesiritide, nitroglycerin, nitroprusside, norepinephrine, octreotide, oxaliplatin, oxytocin, palonosetron, penicillin G potassium, potassium chloride/phosphate, quinupristin/dalfopristin, ranitidine, rocuronium, tacrolimus, tirofiban, tobramycin, trimethoprim/sulfamethoxazole, vancomycin, vasopressin, vecuronium, vinCRIStine, voriconazole, zoledronic acid

SIDE EFFECTS

CNS: *Headache, dizziness,* anxiety, depression, confusion, paresthesia, somnolence, *flushing*

CV: Edema, bradycardia, hypotension, palpitations, pulmonary edema, chest pain, tachycardia, increased angina, arrhythmias, CHF

GI: Nausea, vomiting, gastric upset, constipation, hepatitis, abdominal cramps, dry mouth, sore throat

GU: Nocturia, polyuria

INTEG: Rash, inf site discomfort, Stevens-Johnson syndrome

OTHER: Blurred vision, flushing, sweating, SOB, impotence

PHARMACOKINETICS

Metabolized by liver, excreted in urine 60%, feces 35%

PO: Onset 30 min, peak 1-2 hr, duration 8 hr

PO-SR: Onset unknown, peak 2-6 hr, duration 10-12 hr, half-life 2-5 hr

INTERACTIONS

Increase: effects of digoxin, neuromuscular blocking agents, theophylline, other antihypertensives, nitrates, alcohol, quiNIDine

Increase: niCARdipine effects—cimetidine

Increase: toxicity risk—cycloSPORINE, prazosin, carBAMazepine, quiNIDine, propranolol

Decrease: antihypertensive effect—NSAIDs, rifampin

Drug/Herb

Increase: effect—ginkgo, ginseng, hawthorn

Decrease: effect—ephedra, melatonin, St. John's wort, yohimbe

Drug/Food

Increase: hypotensive effect—grapefruit juice

Increase: LFTs

Drug/Lab Test

Decrease: potassium (IV), phosphate, platelets

NURSING CONSIDERATIONS

Assess:

⚠ Cardiac status: B/P often, pulse, respiration, ECG during long-term treatment

- **Anginal pain:** intensity, location, duration; alleviating, precipitating factors

• Potassium, renal, hepatic studies periodically

⚠ **CHF:** weight gain, crackles, jugular venous distention, dyspnea, I&O

• **Hypertension:** decreasing B/P; assess salt in diet, smoking, exercise, weight, monitor B/P often

Evaluate:

• Therapeutic response: decreased anginal pain, decreased B/P

Teach patient/family:

• To avoid hazardous activities until stabilized on product, dizziness is no longer a problem

• To limit caffeine consumption; to avoid alcohol products, to take without regard to food, avoid high-fat foods, to swallow sus rel product whole

• To avoid OTC products, grapefruit juice unless directed by prescriber

• **Hypertension:** comply in all areas of medical regimen: diet, exercise, stress reduction, product therapy

⚠ To notify prescriber of irregular heartbeat, SOB, swelling of feet and hands, pronounced dizziness, constipation, nausea, hypotension, change in severity/pattern/incidence of angina

TREATMENT OF OVERDOSE:

Defibrillation, β-agonists, IV calcium, diuretics, atropine for AV block, vasopressor for hypotension

nicotine

(nik'o-teen)

nicotine chewing gum

CVS Nicotine Polacrilex, Equate Nicotine, GNP Nicotine, Good Sense Nicotine, Leader Nicotine Gum, NICOrelief, Nicorette, Publix Stop Smoking Aid, TopCare Nicotine, Walgreens Nicotine

nicotine inhaler (OTC, Rx)

Nicotrol

nicotine lozenge (OTC)

CVS Nicotine Polacrilex, GNP Nicotine Polacrilex, Good Sense Nicotine, Polacrilex, TopCare Nicotine Polacrilex, Walgreens Nicotine Polacrilex

nicotine nasal spray (Rx)

Nicotrol NS

nicotine transdermal (OTC, Rx)

CVS Nicotine Transdermal System, Equate Nicotine Transdermal System, Habitrol ✦, Leader Nicotine Transdermal Patch, Nicoderm CQ, Sunmark Nicotine Transdermal System, Walgreens Nicotine Transdermal Patch

Func. class.: Smoking deterrent

Chem. class.: Ganglionic cholinergic agonist

ACTION: Agonist at nicotinic receptors in peripheral, central nervous systems; acts at sympathetic ganglia, on chemoreceptors of aorta, carotid bodies; also affects adrenalin-releasing catecholamines

USES: Deter cigarette smoking
Unlabeled uses: Gilles de la Tourette's syndrome, ulcerative colitis

CONTRAINDICATIONS: Pregnancy (D) (transdermal, inhaler); hypersensitivity, immediate post-MI recovery period, severe angina pectoris
Precautions: Pregnancy (C) (gum); breastfeeding, vasospastic disease, dysrhythmias, diabetes mellitus, hyperthyroidism, pheochromocytoma, esophagitis, peptic ulcer, coronary/renal/hepatic disease; MRI (patch)

DOSAGE AND ROUTES

Nicotine chewing gum
• **Adult:** Chew 1 piece of gum (2 mg nicotine) whenever urge to smoke occurs; dose varies; usually 20 mg/day during first mo, max 24 pieces/day, max 3 mo

Nicotine inhaler
• **Adult: INH** 6 cartridges/day for first 3-6 wk, max 16 cartridges/day × 12 wk

Nicotine lozenge
• **Adult:** If cigarette is desired >30 min after awakening, start with 2-mg lozenge; if <30 min after awakening, start with 4-mg lozenge then again q1-2hr, max 20 lozenges/day or 5 lozenges/6 hr × 6 wk, then 1 lozenge q2-4hr × 2 wk, then 1 lozenge q4-8hr × 2 wk, then discontinue

Nicotine nasal spray
• **Adult:** 1 spray in each nostril 1-2×/hr, max 5×/hr or 40×/day, max 3 mo

Nicotine transdermal/inhaler system
• **Habitrol ♣, Nicoderm:** 21 mg/day × 4-8 wk; 14 mg/day × 2-4 wk; 7 mg/day × 2-4 wk
• **Nicotrol:** 15 mg/day × 12 wk; 10 mg/day × 2 wk; 5 mg/day × 2 wk
• **Nicotrol Inhaler:** delivers 30% of nicotine that smoker receives from an actual cigarette

Gilles de la Tourette's syndrome (unlabeled)
• **Adult and child: Chewing gum** 2 mg chewed × 30 min bid for 1-6 mo; **TRANSDERMAL** 7- or 10-mg patch daily × 2 days

Available forms: Transdermal patch (Habitrol ♣, Nicoderm, nicotine transdermal system) delivering 7, 14, 21 mg/day; (Nicoderm) 5, 10, 15 mg/day; **nicotine inhaler** 4 mg delivered; **nasal spray** 0.5 mg nicotine/actuation; **gum** 2, 4 mg/piece; **lozenge** 2 mg, 4 mg

Administer:
• **Gum:** chew gum slowly for 30 min to promote buccal absorption of product; do not chew >45 min
• Begin product withdrawal after 3 mo of use; do not exceed 6 mo
• **Transdermal patch:** 1×day to nonhairy, clean, dry area of skin on upper body or upper outer arm; rotate sites to prevent skin irritation
• **Inhaler:** puffing on mouthpiece delivers nicotine through mouth

SIDE EFFECTS

CNS: Dizziness, vertigo, insomnia, headache, confusion, seizures, depression, euphoria, numbness, tinnitus, strange dreams
CV: Dysrhythmias, tachycardia, palpitations, edema, flushing, hypertension
EENT: Jaw ache, irritation in buccal cavity
GI: *Nausea, vomiting, anorexia, indigestion,* diarrhea, abdominal pain, constipation, eructation, irritation
RESP: Breathing difficulty, cough, hoarseness, sneezing, wheezing, bronchial spasm

PHARMACOKINETICS

Onset 15-30 min, metabolized in liver, excreted in urine, half-life 2-3 hr, 30-120 hr (terminal)

INTERACTIONS

Increase: vasoconstriction—ergots, bromocriptine, cabergoline
Increase: effect of—adenosine
Increase: B/P—buPROPion
Decrease: effect of—α-blockers, insulin

Decrease: nicotine clearance—cimetidine

Drug/Food

• Avoid use of gum with acidic foods (colas, coffee) and for 15 min after

NURSING CONSIDERATIONS

Assess:

• **Smoking:** number of cigarettes smoked, years used; **withdrawal:** headache, cravings, restlessness, irritation, drowsiness, insomnia, sore throat, increased appetite

• **Adverse reaction:** irritation of buccal cavity, dislike of taste, jaw ache

Evaluate:

• Therapeutic response: decrease in urge to smoke, decreased need for gum after 3-6 mo

Teach patient/family:

• **Gum:** about all aspects of product use; give package insert to patient and explain

• That gum will not stick to dentures, dental appliances

• That gum is as toxic as cigarettes; that it is to be used only to deter smoking, call prescriber immediately, stop use if difficulty breathing or rash occur

• To avoid use during pregnancy

• **Transdermal patch:** that patch is as toxic as cigarettes; to be used only to deter smoking

• Not to use during pregnancy because birth defects may occur; not to breastfeed

• To keep used and unused system out of reach of children and pets

• To stop smoking immediately when beginning patch treatment

• To apply promptly after removing from protective patch because system may lose strength

• **Nasal spray:** to tilt head back; not to swallow or inhale during administration; after smoking is stopped, to use spray up to 8 wk then discontinue over 6 wk by tapering

• **Lozenges:** to allow to dissolve; to avoid swallowing

• **Inhalation:** to use by inhaler for 20 min

NIFEdipine (Rx)

(nye-fed'i-peen)

Adalat CC, Afeditab CR, Apo-Nifed ♣, Apo-Nifed PA ♣, Nifediac CC, Nifedical XL, Procardia, Procardia XL

Func. class.: Calcium channel blocker, antianginal, antihypertensive

Chem. class.: Dihydropyridine

Do not confuse:

NIFEdipine/niCARdipine/niMODipine

ACTION: Inhibits calcium ion influx across cell membrane during cardiac depolarization; relaxes coronary vascular smooth muscle; dilates coronary arteries; increases myocardial oxygen delivery in patients with vasospastic angina; dilates peripheral arteries

USES: Chronic stable angina pectoris, vasospastic angina, hypertension

Unlabeled uses: Migraines, preterm labor, chronic/acute hypertension (pediatrics), diabetic nephropathy, proteinuria, hiccups

CONTRAINDICATIONS: Hypersensitivity to this product or dihydropyridine; cardiogenic shock

Precautions: Pregnancy (C), breastfeeding, children, CHF, hypotension, sick sinus syndrome, 2nd-/3rd-degree heart block, hypotension <90 mm Hg systolic, hepatic injury, renal disease, acute MI, aortic stenosis, GERD, heart failure

DOSAGE AND ROUTES

• **Adult: PO** Immediate release 10 mg tid, increase in 10-mg increments q7-14days, max 180 mg/24 hr or single dose of 30 mg; **SUS REL** 30-60 mg/day, may increase q7-14days, max 90 mg/day

Hypertension

• **Adult: PO EXT REL** 30-60 mg daily, titrate upward as needed, max 90 mg/day (Adalat CC), 120 mg/day (Procardia XL)

• **Child/adolescent (unlabeled): PO EXT REL** 0.25-0.5 mg/kg/day, max 3 mg/kg/day

Acute hypertensive episodes in pediatric patients (unlabeled)

• **Adolescent/child/infant: PO** 0.2-0.5 mg/kg/dose up to 10 mg (total dose)

Migraine prophylaxis (unlabeled)

• **Adult: PO** 30-180 mg/day

Preterm labor (unlabeled)

• **Pregnant female: PO** Immediate release (Procardia, Adalat) 30-mg loading dose then 10-20 mg q4-6hr; use in monitored settings

Available forms: Caps 5 ✤, 10, 20 mg; ext rel tabs (CC, XL) 10 ✤, 20 ✤, 30, 60, 90 mg; tabs 10 mg ✤

Administer:

• Do not break, crush, or chew ext rel tabs, do not use immediate release caps within 7 days of MI, coronary syndrome

• Without regard to meals; avoid grapefruit juice

• Protect caps from direct light, keep in dry area, do not freeze

SIDE EFFECTS

CNS: *Headache,* fatigue, drowsiness, *dizziness,* anxiety, depression, weakness, insomnia, light-headedness, paresthesia, tinnitus, blurred vision, nervousness, tremor, *flushing*

CV: Dysrhythmias, edema, hypotension, palpitations, tachycardia

GI: Nausea, vomiting, diarrhea, gastric upset, constipation, increased LFTs, dry mouth, flatulence, gingival hyperplasia

GU: *Nocturia, polyuria*

HEMA: Bruising, bleeding, petechiae

INTEG: Rash, pruritus, flushing, hair loss, Stevens-Johnson syndrome, toxic epidermal necrolysis, exfoliative dermatitis

MISC: Sexual difficulties, cough, fever, chills

PHARMACOKINETICS

Metabolized by liver; excreted in urine 60%-80% (metabolites), feces 15%; protein binding 90%-98%

PO: Onset 20 min, peak 0.5-6 hr, duration 6-8 hr, half-life 2-5 hr, well absorbed

PO-ER: Duration 24 hr

INTERACTIONS

⚠ Contraindicated with strong CYP3A4 inducers

Increase: level of digoxin, phenytoin, cycloSPORINE, prazosin, carBAMazepine

⚠ **Increase:** NIFEdipine, toxicity—cimetidine, ranitidine

Increase: effects of β-blockers, antihypertensives

Decrease: antihypertensive effect—NSAIDs

Decrease: effects of quiNIDine

Decrease: NIFEdipine level—smoking

Drug/Herb

Increase: effect—ginkgo biloba, ginseng, hawthorn

Decrease: effect—ephedra, melatonin, St. John's wort, yohimbe

Drug/Food

Increase: NIFEdipine level—grapefruit juice

Drug/Lab Test

Increase: CPK, LDH, AST

Positive: ANA, direct Coombs' test

NURSING CONSIDERATIONS

Assess:

• **Anginal pain:** location, intensity, duration, character, alleviating, aggravating factors

• Cardiac status: B/P, pulse, respiration, ECG at baseline and periodically, in those taking antihypertensives, β-blockers, monitor B/P often

• Potassium, renal, hepatic studies periodically during treatment

• For bruising, petechiae, bleeding

• **GI obstruction:** Ext rel products have been associated with rare reports of obstruction in those with strictures and no known GI disease

• **Serious skin disorders:** rash that starts suddenly, fever, cutaneous lesions that may have pustules present; discontinue product

N

Evaluate:
- Therapeutic response: decreased anginal pain, B/P, activity tolerance

Teach patient/family:
- To avoid hazardous activities until stabilized on product, dizziness is no longer a problem
- To limit caffeine consumption; to avoid alcohol products
- To avoid OTC products unless directed by prescriber without regard to meals, Adelat CC should be taken on empty stomach
- That empty tab shells may appear in stools and is not significant
- **Hypertension:** to comply with all areas of medical regimen: diet, exercise, stress reduction, product therapy
- To change position slowly because orthostatic hypotension is common
- ⚠ To notify prescriber of dyspnea, edema of extremities, nausea, vomiting, severe ataxia, severe rash; changes in pattern, frequency, severity of angina
- To increase fluid intake to prevent constipation
- To check for gingival hyperplasia and report promptly
- Not to discontinue abruptly; to gradually taper

TREATMENT OF OVERDOSE:
Defibrillation, atropine for AV block, vasopressor for hypotension

nilotinib (Rx)
(nye-loe'ti-nib)

Tasigna

Func. class.: Antineoplastic—miscellaneous

Chem. class.: Protein-tyrosine kinase inhibitor

ACTION:
Inhibits BCR-ABL tyrosine kinase created in patients with chronic myeloid leukemia (CML)

USES:
Chronic phase/accelerated phase Philadelphia-chromosome–positive CML that is resistant or intolerant to imatinib

CONTRAINDICATIONS:
Pregnancy (D), breastfeeding, hypersensitivity

Black Box Warning: Hypokalemia, hypomagnesemia, QT prolongation

Precautions: Children, females, geriatric patients, active infections, anemia, cardiac disease, bone marrow suppression, cholestasis, diabetes, gelatin hypersensitivity, infertility, galactose-free diet, lactase deficiency, neutropenia, pancreatitis, thrombocytopenia

Black Box Warning: Hepatic disease

DOSAGE AND ROUTES
- **Adult: PO** 400 mg q12hr, continue until disease progression or unacceptable toxicity

Adjustment after discontinuation of a strong CYP3A4 inducer
- **Adult: PO** Reduce to 400 mg/bid

For those taking a strong CYP3A4 inhibitor
- **Adult: PO** Reduce dose to 300 mg/day

QT prolongation
- **QTcF >480 msec:** Withhold dose

Myelosuppression
- **ANC 1 × 109/L or platelets <50 × 109/L:** Withhold dose

Hepatic dose
- **Adult: PO** (Child-Pugh A/B/C) newly diagnosed CML 200 mg bid, then escalation to 300 mg bid initially

Available forms: Caps 150, 200 mg

Administer:
- Do not break, crush, or chew caps; if whole capsule cannot be swallowed, disperse capsule contents in 1 tsp. applesauce
- Without regard to meals; separate doses by 12 hr; make-up dose should not be taken if dose is missed

SIDE EFFECTS

CNS: Headache, dizziness, fatigue, fever, flushing, paresthesia
CV: QT prolongation, palpitations, torsades de pointes, AV block
GI: *Nausea,* hepatotoxicity, vomiting, dyspepsia, *anorexia, abdominal pain,* constipation, pancreatitis, diarrhea, xerostomia
HEMA: Neutropenia, thrombocytopenia, anemia, pancytopenia
INTEG: *Rash,* alopecia, erythema
META: Hyperamylasemia, hyperbilirubinemia, hyperglycemia, hyperkalemia, hypocalcemia, hyponatremia, hypomagnesemia
MISC: Diaphoresis, anxiety
MS: Arthralgia, myalgia, back or bone pain, muscle cramps
RESP: Cough, dyspnea
SYST: Bleeding, tumor lysis syndrome

PHARMACOKINETICS

Protein binding 98%, metabolized by CYP3A4, plasma levels 3 hr, elimination half-life 17 hr

INTERACTIONS

- Product interactions are numerous
- Do not use with phenothiazines, pimozide, ziprasidone

Increase: QT prolongation—class IA/III antidysrhythmics, some phenothiazines, β agonists, local anesthetics, tricyclics, haloperidol, chloroquine, droperidol, pentamidine; CYP3A4 inhibitors (amiodarone, clarithromycin, erythromycin, telithromycin, troleandomycin), arsenic trioxide, levomethadyl; CYP3A4 substrates (methadone, pimozide, QUEtiapine, quiNIDine, risperiDONE, ziprasidone)
Increase: hepatotoxicity—acetaminophen
Increase: concentrations—ketoconazole, itraconazole, erythromycin, clarithromycin
Increase: plasma concentrations of simvastatin, calcium channel blockers
Increase: plasma concentration of warfarin; avoid use with warfarin, use low-molecular-weight anticoagulants instead
Decrease: concentrations—dexamethasone, phenytoin, carBAMazepine, rifampin, PHENobarbital

Drug/Herb
Decrease: concentration—St. John's wort

Drug/Food
Increase: plasma concentrations—grapefruit juice

NURSING CONSIDERATIONS

Assess:
- **Tumor lysis syndrome:** maintain hydration, correct uric acid before use with this product

Black Box Warning: QT prolongation can occur; monitor ECG, left ventricular ejection fraction (LVEF) at baseline periodically; hypertension, assess for chest pain, palpitations, dyspnea

Black Box Warning: Hepatotoxicity: monitor LFTs before treatment and monthly; if liver transaminases $>5 \times$ IULN, withhold until transaminase levels return to $<2.5 \times$ IULN

- **Myelosuppression:** CBC, differential, platelet count; for bleeding: epistaxis, rectal, gingival, upper GI, genital and wound bleeding; tumor-related hemorrhage may occur rapidly
- ANC and platelets; if ANC $<1 \times 10^9$/L and/or platelets $<50 \times 10^9$/L, stop until ANC $>1.5 \times 10^9$/L and platelets $>75 \times 10^9$/L
- **Electrolytes:** calcium, potassium, magnesium, sodium; lipase, phosphate; hypokalemia, hypomagnesemia should be corrected before use

Perform/provide:
- Storage at 59° F-86° F (15° C- 30° C)

Evaluate:
- Therapeutic response: decrease in progression of disease

Teach patient/family:
- To report adverse reactions immediately: SOB, bleeding

- About reason for treatment, expected results
- That many adverse reactions may occur
- To avoid persons with known upper respiratory tract infections; immunosuppression is common
- To watch for signs, symptoms of low potassium or magnesium

nisoldipine (Rx)

(nye-sole'dih-peen)

Sular

Func. class.: Calcium channel blocker, antihypertensive

Chem. class.: Dihydropyridine

Do not confuse:
nisoldipine/NIFEdipine/niMODipine

ACTION: Inhibits calcium ion influx across the cell membrane, thereby resulting in the dilation of peripheral arteries

USES: Essential hypertension, alone or in combination with other antihypertensives

Unlabeled uses: Variant (Prinzmetal's) angina, stable angina pectoris

CONTRAINDICATIONS: Hypersensitivity to this product or dihydropyridines; sick sinus syndrome; 2nd-/3rd-degree heart block; aortic stenosis

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, CHF, hypotension <90 mm Hg systolic, hepatic injury, renal disease, acute MI, unstable angina, CAD, cardiogenic shock

DOSAGE AND ROUTES

Hypertension

- **Adult: PO** 17 mg/day initially, may increase by 8.5 mg/wk, usual dose 17-34 mg/day, max 34 mg/day
- **Geriatric/hepatic dose: PO** 8.5 mg/day, increase based on patient response

Variant (Prinzmetal's) angina/ stable angina pectoris (unlabeled)

- **Adult: PO** 17-34 mg/day, max 34 mg/day

Hepatic dose

- **Adult: PO** 8.5 mg/day

Available forms: Ext rel tabs 8.5, 17, 20, 25.5, 30, 34, 40 mg

Administer:

PO route

- Swallow whole; do not break, crush, or chew
- Once daily as whole tablet; avoid high-fat foods, grapefruit juice

SIDE EFFECTS

CNS: Headache, fatigue, drowsiness, dizziness, anxiety, depression, nervousness, insomnia, lightheadedness, paresthesia, tinnitus, psychosis, somnolence, ataxia, confusion, malaise, migraine, flushing

CV: Dysrhythmia, edema, CHF, hypotension, palpitations, MI, pulmonary edema, tachycardia, syncope, AV block, angina, chest pain, ECG abnormalities

GI: Nausea, vomiting, diarrhea, gastric upset, constipation, increased LFTs, dry mouth, dyspepsia, dysphagia, flatulence

GU: Nocturia, hematuria, dysuria

HEMA: Anemia, leukopenia, petechiae

INTEG: Rash, pruritus

MISC: Sexual difficulties, cough, nasal congestion, SOB, wheezing, epistaxis, dyspnea, gingival hyperplasia, chills, fever, gout, sweating

PHARMACOKINETICS

Metabolized by liver, excreted in urine, peak 6-12 hr, protein binding 99%, half-life 7-12 hr

INTERACTIONS

Increase: effects of β-blockers, antihypertensives, digoxin

Increase: nisoldipine level—CYP3A4 inhibitors, cimetidine, ranitidine, azole antifungals

Decrease: nisoldipine effect—CYP3A4 inducers, hydantoins

Drug/Herb
Increase: B/P—ephedra, melatonin
Decrease: B/P—hawthorn
Decrease: nisoldipine effect—St. John's wort, ginseng, ginkgo biloba
Drug/Food
Increase: nisoldipine level—high-fat foods
Increase: hypotensive effect—grapefruit juice

NURSING CONSIDERATIONS

Assess:
• Cardiac status: B/P, pulse, respiration, ECG before treatment and periodically
• **CHF:** weight gain, jugular venous distention, edema, crackles, I&O ratios
• **Angina:** frequency, severity of attacks, if angina worsens, report immediately
Evaluate:
• Therapeutic response: decreased B/P
Teach patient/family:
• To avoid hazardous activities until stabilized on product, dizziness is no longer a problem
• To report nausea, dizziness, swelling, SOB, palpitations, severe headache
• To avoid OTC products unless directed by prescriber; to avoid grapefruit juice
• About the importance of complying with all areas of the medical regimen: diet, exercise, stress reduction, product therapy
• To rise slowly to prevent orthostatic hypotension
• If dose is missed, to take as soon as remembered; not to double dose
• How to perform B/P monitoring at home

TREATMENT OF OVERDOSE:

Defibrillation, atropine for AV block, vasopressor for hypotension

nitazoxanide (Rx)

(nye-taz-ox'a-nide)
Alinia
Func. class.: Antiprotozoal

ACTION: Interferes with DNA/RNA synthesis in protozoa

USES: Diarrhea caused by *Cryptosporidium parvum* or *Giardia lamblia*

CONTRAINDICATIONS: Hypersensitivity
Precautions: Pregnancy (B), breastfeeding, children <1 yr or >11 yr, renal/hepatic disease, diabetes mellitus (contains sucrose), HIV, immunocompromised patients

DOSAGE AND ROUTES

• **Adult: PO** 500 mg q12hr × 3 days
• **Child 4-11 yr: PO** 10 ml (200 mg) q12hr × 3 days
• **Child 12-47 mo: PO** 5 ml (100 mg) q12hr × 3 days
Available forms: Powder for oral susp 100 mg/5 ml; tab 500 mg
Administer:
PO route
• With food
• Shake oral suspension before giving, discard after 1 wk

SIDE EFFECTS

CNS: *Dizziness, fever, headache*
CV: Hypotension
GI: *Nausea,* anorexia, flatulence, increased appetite, enlarged salivary glands, abdominal pain, diarrhea, vomiting
HEMA: Anemia, leukopenia, neutropenia
INTEG: Pruritus, sweating
MISC: Increased creatinine, pale yellow eye discoloration, rhinitis, discolored urine, infection, malaise

PHARMACOKINETICS

Peak 1-4 hr; excreted in urine, bile, feces; hydrolyzed to active metabolite, which undergoes conjugation; metabolite protein binding >99%

INTERACTIONS

• Competes for binding sites: other highly protein-bound products; phenytoin, salicylates

Drug/Lab Test

Increase: creatinine, GPT

NURSING CONSIDERATIONS

Assess:

• Signs of infection

• Bowel pattern before, during treatment

Evaluate:

• Therapeutic response: C&S negative for organism, decreased diarrhea

Teach patient/family:

• To take with food; shake susp well before each dose, discard susp after 7 days

nitrofurantoin (Rx)

(nye-troe-fyoor'an-toyn)

Furadantin, Macrobid, Macrodantin, Novo-Furantoin

Func. class.: Urinary tract antiinfective

Chem. class.: Synthetic nitrofuran derivative

ACTION: Inhibits bacterial acetyl-CoA inteference with carbohydrate metabolism

USES: Urinary tract infections caused by *Escherichia coli, Klebsiella, Pseudomonas, Proteus vulgaris, Proteus morganii, Serratia, Citrobacter, Staphylococcus aureus, Staphylococcus epidermidis, Enterococcus, Salmonella, Shigella*

CONTRAINDICATIONS: Infants <1 mo, hypersensitivity, anuria, severe renal disease CCr <60 ml/min, at term pregnancy (38-42 wk), labor, delivery, cholestatic jaundice due to nitrofurantoin therapy

Precautions: Pregnancy (B), breastfeeding, geriatric patients, G6PD deficiency, GI disease, diabetes

DOSAGE AND ROUTES

Active infections

• **Adult: PO** 50-100 mg qid after meals

• **Child: PO** 5-7 mg/kg/day in 4 divided doses

Chronic suppression

• **Adult: PO** 50-100 mg q PM

• **Child: PO** 1-2 mg/kg/day in PM or 0.5-1 mg/kg q12hr if dose not well tolerated

Available forms: Caps 25, 50, 100 mg; susp 25 mg/5 ml; macrocrystal caps (Macrodantin) 25, 50, 100 mg; Macrobid cap 100 mg (25 macrocrystals, 75 monohydrate)

Administer:

PO route

• Give with meals

• Do not break, crush, chew, or open tabs, caps, store in original container

• Two daily doses if urine output is high or if patient diabetic

• Use calibrated device to measure liquid product; may mix water, fruit juice; rinse mouth after liquid product; staining of teeth may occur

SIDE EFFECTS

CNS: *Dizziness, headache,* drowsiness, peripheral neuropathy, chills, confusion, vertigo

CV: Bundle branch block, chest pain

GI: *Nausea, vomiting, abdominal pain, diarrhea,* cholestatic jaundice, loss of appetite, pseudomembranous colitis, hepatitis, pancreatitis

HEMA: Anemia, agranulocytosis, hemolytic anemia, leukopenia, thrombocytopenia

INTEG: Pruritus, rash, urticaria, angioedema, alopecia, tooth staining, exfoliative dermatitis, Stevens-Johnson syndrome
MS: Arthralgia, myalgia, numbness, peripheral neuropathy
RESP: Cough, dyspnea, pneumonitis, pulmonary fibrosis or infiltrate
SYST: Superinfection, SLE-like syndrome

PHARMACOKINETICS

PO: Half-life 20-60 min; crosses blood-brain barrier, placenta; enters breast milk; excreted as inactive metabolites in liver, unchanged in urine; protein binding 60%-90%

INTERACTIONS

Increase: antagonistic effect—norfloxacin
Increase: levels of nitrofurantoin—probenecid
Decrease: absorption of magnesium trisilicate antacid
Drug/Lab Test
Increase: BUN, alk phos, bilirubin, creatinine, blood glucose

NURSING CONSIDERATIONS

Assess:
• Blood count during chronic therapy, LFTs, pulmonary function tests
• **Urinary tract infection:** burning, pain on urination; fever; cloudy, foul-smelling urine; I&O ratio: C&S before treatment, after completion; serum creatinine, BUN
• **Pseudomembraneous colitis:** diarrhea with mucus, abdominal pain, fever, fatigue, anorexia; may be treated with vancomycin or metroNIDAZOLE
• CNS symptoms: insomnia, vertigo, headache, drowsiness, seizures
⚠ **Hepatotoxicity:** yellowing of skin or eyes, dark urine, clay-colored stools; monitor AST, ALT
⚠ **Pulmonary fibrosis, pneumonitis:** dyspnea, tachypnea, persistent cough
⚠ **Serious skin disorders:** fever, flushing, rash, urticaria, pruritus
• **Peripheral neuropathy:** paresthesias (more common in diabetes mellitus, electrolyte imbalances, vit B deficiency, debilitated patients)
Evaluate:
• Therapeutic response: decreased dysuria, fever; negative C&S
Teach patient/family:
• To notify prescriber of continued symptoms of UTI, fever, myalgias, arthralgias, numbness or tingling of extremities
• To take with food or milk; to avoid alcohol
• To protect susp from freezing; shake well before taking
• That product may cause drowsiness; to seek aid with walking, other activities; not to drive or operate machinery while taking medication
• That diabetics should monitor blood glucose levels
• That product may turn urine rust-yellow to brown
⚠ **Pseudomembranous colitis:** fever; diarrhea with mucus, pus, or blood; report immediately

N

nitrofurazone topical

See Appendix B

nitroglycerin (Rx)
(nye-troe-gli'ser-in)
extended release caps (Rx)
Nitro-Time
topical ointment (Rx)
Nitro-Bid
rectal ointment
Rectiv
SL (Rx)
Nitrostat
translingual spray (Rx)
Nitrolingual
transdermal (Rx)
Minitran, Nitro-Dur
Func. class.: Coronary vasodilator, antianginal
Chem. class.: Nitrate

Do not confuse:
Nitro-Bid/Nicobid

ACTION: Decreases preload and afterload, which are responsible for decreasing left ventricular end-diastolic pressure, systemic vascular resistance; dilates coronary arteries, improves blood flow through coronary vasculature, dilates arterial and venous beds systemically

USES: Chronic stable angina pectoris, prophylaxis of angina pain, CHF, acute MI, controlled hypotension for surgical procedures, anal fissures
Unlabeled uses: Pulmonary hypertension, hemorrhoids, retained placenta

CONTRAINDICATIONS: Hypersensitivity to this product or nitrites; severe anemia, increased intracranial pressure, cerebral hemorrhage, closed-angle glaucoma, cardiac tamponade, cardiomyopathy, constrictive pericarditis

Precautions: Pregnancy (C), breastfeeding, children, postural hypotension, severe renal/hepatic disease, acute MI, abrupt discontinuation, hyperthyroidism

DOSAGE AND ROUTES

• **Adult: SL** Dissolve tab under tongue when pain begins; may repeat q5min until relief occurs; take ≤3 tabs/15 min; use 1 tab prophylactically 5-10 min before activities; **SUS CAP** q6-12hr on empty stomach; **TOP** 1-2 in q8hr, increase to 4 in q4hr as needed; **IV** 5 mcg/min then increase by 5 mcg/min q3-5min; if no response after 20 mcg/min, increase by 10-20 mcg/min until desired response; **TRANS PATCH** apply a pad daily to a site free of hair; remove patch at bedtime to provide 10-12 hr nitrate-free interval to avoid tolerance
• **Child: IV** Initially 0.25-0.5 mcg/kg/min, titrate to patient response, usual dose 1-3 mcg/kg/min transmucosal
Anal fissures (Rectiv)
• **Adult: Rectal** Apply 1 inch of 0.4% ointment q12hr × 3 wk
Available forms: Translingual aero 0.4 mg/metered spray; sus rel tabs 2.6, 6.5, 9 mg; SL tabs 0.3, 0.4, 0.6 mg; topical oint 2%; trans syst 0.1, 0.2, 0.3, 0.4, 0.6, 0.8 mg/hr; inj sol 25 mg/250 ml, 50 mg/250 ml, 50 mg/500 ml, 100 mg/250 ml, 200 mg/500 ml; rectal ointment 0.4% (Rectiv)
Administer:
• **Topical ointment** should be measured on papers supplied, use paper to spread on nonhairy area of chest, abdomen, thigh skin; thin layer spread over 2-3 inches, do not rub
PO route
• Swallow sus rel products whole; do not break, crush, or chew
• With 8 oz water on empty stomach (oral tablet) 1 hr before or 2 hr after meals
• **SL:** should be dissolved under tongue, not swallowed
• **Aerosol** sprayed under tongue **(nitrolingual)**, not inhaled; prime before

1st-time use or if product has not been used in >6 wk; press valve head with forefinger

Transdermal route

• Apply new TD patch daily, remove after 12-14 hr to prevent tolerance

Rectal route

• Cover finger with plastic wrap, disposable glove, or finger cot; lay finger alongside 1-inch dosing line on carton, squeeze tube until equal to 1-inch dosing line; insert covered finger gently into anal canal no further than 1st finger joint and apply to sides; wash hands thoroughly; if too painful, apply directly to outside of anus

Continuous IV INF route

• Diluted in D_5, D_5W, 0.9% NaCl for inf to 200-400 mcg/ml, depending on patient's fluid status; common dilution 50 mg/250 ml, use controlled inf device; use glass inf bottles, non–polyvinyl-chloride inf tubing; titrate to patient response; do not use filters

Y-site compatibilities: Acyclovir, alfentanil, amikacin, aminocaproic acid, aminophylline, amiodarone, amphotericin B cholesteryl, amphotericin B lipid complex, amphotericin B liposome, anidulafungin, argatroban, ascorbic acid, atenolol, atracurium, atropine, azaTHIOprine, aztreonam, benztropine, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, caspofungin, cefamandole, ceFAZolin, cefmetazole, cefonicid, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, cefTAZidime, ceftizoxime, ceftRIAXone, cefuroxime, cephalothin, cephapirin, chloramphenicol, chlorproMAZINE, cimetidine, cisatracurium, CISplatin, clindamycin, cloNIDine, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, dexamethasone, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, doxacurium, DOXOrubicin, doxycycline, drotrecogin alfa, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, epoetin alfa, eptifibatide, ertapenem, erythromycin, esmolol, etoposide, famotidine, fenoldopam, fentaNYL, fluconazole, fludarabine, fluorouracil, folic acid, ganciclovir, gatifloxacin, gemcitabine, gemtuzumab, gentamicin, glycopyrrolate, granisetron, heparin, hydrocortisone, HYDROmorphone, hydrOXYzine, IDArubicin, ifosfamide, imipenem-cilastatin, indomethacin, insulin (regular), irinotecan, isoproterenol, ketorolac, labetalol, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, meperidine, metaraminol, methicillin, methotrexate, methoxamine, methyldopate, methylPREDNISolone, metoclopramide, metroNIDAZOLE, mezlocillin, micafungin, miconazole, midazolam, milrinone, minocycline, mitoXANtrone, morphine, moxalactam, mycophenolate, nafcillin, nalbuphine, naloxone, nesiritide, netilmicin, niCARdipine, nitroprusside, norepinephrine, octreotide, ondansetron, oxacillin, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pamidronate, pancuronium, pantoprazole, papaverine, PEMEtrexed, penicillin G potassium/sodium, pentamidine, pentazocine, PENTobarbital, PHENobarbital, phentolamine, phenylephrine, phytonadione, piperacillin, piperacillin-tazobactam, polymyxin B, potassium chloride, procainamide, prochlorperazine, promethazine, propofol, propranolol, protamine, pyridoxine, quiNIDine, quinupristin-dalfopristin, ranitidine, remifentanil, ritodrine, rocuronium, sodium bicarbonate, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiamine, thiopental, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, tobramycin, tolazoline, trimetaphan, urokinase, vancomycin, vasopressin, vecuronium, verapamil, vinCRIStine, vinorelbine, voriconazole, warfarin, zoledronic acid

SIDE EFFECTS

CNS: *Headache, flushing, dizziness*
CV: *Postural hypotension,* tachycardia, collapse, syncope, palpitations

GI: Nausea, vomiting
INTEG: Pallor, sweating, rash

PHARMACOKINETICS

Metabolized by liver, excreted in urine, half-life 1-4 min
SUS REL: Onset 20-45 min, duration 3-8 hr
SL: Onset 1-3 min, duration 30 min
TRANSDERMAL: Onset 30 min-1 hr, duration 12-24 hr
AEROSOL: Onset 2 min, duration 30-60 min
TOPICAL OINT: Onset 30-60 min, duration 2-12 hr
IV: Onset 1-2 min, duration 3-5 min

INTERACTIONS

• Severe hypotension, CV collapse: alcohol
Increase: effects of β-blockers, diuretics, antihypertensives, calcium channel blockers
Increase: fatal hypotension—sildenafil, tadalafil, vardenafil; do not use together
Increase: nitrate level—aspirin
Decrease: heparin—IV nitroglycerin
Drug/Lab Test
Increase: urine catecholamine, urine VMA
False increase: cholesterol

NURSING CONSIDERATIONS

Assess:
• **Pain:** duration, time started, activity being performed, character
• Orthostatic B/P, pulse prior to and after administration
• Tolerance if taken over long period
• Headache, lightheadedness, decreased B/P; may indicate a need for decreased dosage
Evaluate:
• Therapeutic response: decrease, prevention of anginal pain
Teach patient/family:
• To place buccal tab between lip and gum above incisors or between cheek and gum
• To keep tabs in original container; to replace q6mo because effectiveness is lost; to keep away from heat, moisture, light
• That if 3 SL tabs in 15 min do not relieve pain, to seek immediate medical attention
• To avoid alcohol
• That product may cause headache; that tolerance usually develops; to use nonopioid analgesic
• That product may be taken before stressful activity: exercise, sexual activity
• That SL may sting when product comes in contact with mucous membranes
• To avoid hazardous activities if dizziness occurs
• To comply with complete medical regimen
• To make position changes slowly to prevent fainting
⚠ Never to use erectile dysfunction products (sildenafil, tadalafil, vardenafil); may cause severe hypotension, death

⚠ HIGH ALERT

nitroprusside (Rx)

(nye-troe-pruss'ide)
Nitropress
Func. class.: Antihypertensive, vasodilator

ACTION: Directly relaxes arteriolar, venous smooth muscle, thereby resulting in reduction in cardiac preload and afterload

USES: Hypertensive crisis; to decrease bleeding by creating hypotension during surgery; acute CHF
Unlabeled uses: Postoperative hypertension, mitral regurgitation

CONTRAINDICATIONS: Hypersensitivity, hypertension (compensatory) due to aortic coarctation or AV shunting, acute CHF associated with reduced pe-

ripheral vascular resistance, AV shunt, Leber's disease, toxic amblyopia

Black Box Warning: Cyanide toxicity

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, fluid, electrolyte imbalances, renal/hepatic disease, hypothyroidism

Black Box Warning: Hypotension

DOSAGE AND ROUTES

• **Adult and child: IV INF** 0.25-10 mcg/kg/min; max 10 mcg/kg/min

Renal dose

• **Adult: IV INF** CCr <60 ml/min, maintain doses <3 mcg/kg/min to reduce thiocyanate accumulation

Available forms: Inj 50 mg/2 ml

Administer:

• Antidote is sodium thiosulfate

Continuous IV INF route

• Depending on B/P reading q15min

• Reconstitute 50 mg/2-3 ml of D_5W, further dilute in 250, 500, or 1000 ml of D_5W to 200, 100, 50 mcg/ml, respectively; use inf pump only; wrap bottle with aluminum foil to protect from light; observe for color change in inf; discard if highly discolored (blue, green, dark red); titrate to patient response

Y-site compatibilities: Alfentanil, alprostadil, amikacin, aminocaproic acid, aminophylline, amphotericin B lipid compex, amphotericin B liposome, anidulafungin, argatroban, atenolol, atropine, aztreonam, benztropine, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, cefamandole, ceFAZolin, cefmetazole, cefonicid, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, cefTAZidime, ceftizoxime, cefTRIAXone, cefuroxime, cephalothin, chloramphenicol, cimetidine, CISplatin, clindamycin, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, digoxin, diltiazem, DOCEtaxel, DOPamine, doxacurium, DOXOrubicin, doxycycline, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, epoetin alfa, eptifibatide, ertapenem, esmolol, etoposide, famotidine, fenoldopam, fentaNYL, fluconazole, fludarabine, fluorouracil, folic acid, furosemide, ganciclovir, gatifloxacin, gemcitabine, gemtuzumab, gentamicin, glycopyrrolate, granisetron, heparin, hydrocortisone, HYDROmorphone, IDArubicin, ifosfamide, inamrinone, indomethacin, insulin (regular), isoproterenol, ketorolac, labetalol, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, meperidine, metaraminol, methicillin, methoxamine, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, mezlocillin, micafungin, miconazole, midazolam, milrinone, minocycline, morphine, moxalactam, multiple vitamins injection, nafcillin, nalbuphine, naloxone, nesiritide, netilmicin, niCARdipine, nitroglycerin, norepinephrine, octreotide, ondansetron, oxacillin, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pamidronate, pancuronium, pantoprazole, penicillin G potassium/sodium, pentamidine, PENTobarbital, PHENobarbital, phentolamine, phenylephrine, phytonadione, piperacillin, piperacillin-tazobactam, polymyxin B, potassium chloride/phosphates, procainamide, propofol, propranolol, protamine, pyridoxine, ranitidine, ritodrine, rocuronium, sodium acetate/bicarbonate, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiamine, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, tobramycin, tolazoline, trimetaphan, urokinase, vancomycin, vasopressin, vecuronium, verapamil, vinCRIStine, zoledronic acid

SIDE EFFECTS

CNS: *Dizziness, headache,* agitation, twitching, decreased reflexes, restlessness

CV: Bradycardia, ECG changes, tachycardia, hypotension

GI: Nausea, vomiting, abdominal pain

INTEG: Pain, irritation at inj site, sweating
MISC: Cyanide, thiocyanate toxicity, flushing, hypothyroidism

PHARMACOKINETICS

IV: Onset 1-2 min, duration 1-10 min, half-life 3 days in patients with abnormal renal function, circulating half-life 2 min; metabolized in liver, excreted in urine

INTERACTIONS

Increase: severe hypotension—ganglionic blockers, volatile liquid anesthetics, halothane, enflurane, circulatory depressants

Drug/Herb
Increase: antihypertensive effect—hawthorn

NURSING CONSIDERATIONS

Assess:
- Electrolytes: potassium, sodium, chloride, CO_2, CBC, serum glucose, serum methemoglobin if pulmonary O_2 levels are decreased; use IV 1-2 mg/kg methylene blue given over several min for methemoglobinemia
- Renal studies: catecholamines, BUN, creatinine
- Hepatic studies: AST, ALT, alk phos

Black Box Warning: Hypotension: B/P by direct means if possible; check ECG continuously; pulse, jugular venous distention; PCWP; rebound hypertension may occur after nitroprusside is discontinued, give only with emergency equipment nearby, rapid decrease in B/P may occur

- Weight daily, I&O

Thiocyanate, lactate, cyanide toxicity: obtain levels daily if inf >3 mcg/kg/min; thiocyanate level should be ≤1 mmol/L; thiocyanate toxicity includes confusion, weakness, seizures, hyperreflexia, psychosis, tinnitus, coma

- Nausea, vomiting, diarrhea
- Edema in feet, legs daily; skin turgor, dryness of mucous membranes for hydration status
- Crackles, dyspnea, orthopnea q30min
- For decrease in bicarbonate, P_{CO_2} blood pH, acidosis

Evaluate:
- Therapeutic response: decreased B/P, decreasing symptoms of cardiogenic shock or cardiac pump failure

Teach patient/family:
- To report headache, dizziness, loss of hearing, blurred vision, dyspnea, faintness, pain at IV site
- About the reason for giving product and expected results

nizatidine (OTC, Rx)

(ni-za'ti-deen)

Axid, Axid AR

Func. class.: H_2-receptor antagonist
Chem. class.: Substituted thiazole

ACTION: Blocks H_2-receptors, thereby reducing gastric acid output

USES: Benign gastric and duodenal ulceration, prevention of duodenal ulcer recurrence, symptomatic relief of gastroesophageal reflux, heartburn prevention

CONTRAINDICATIONS: Hypersensitivity
Precautions: Pregnancy (B), breastfeeding, renal/hepatic impairment (reduce dose in renal impairment)

DOSAGE AND ROUTES

Gastric and duodenal ulcer
- **Adult: PO** 300 mg at night or 150 mg bid for 4-8 wk; maintenance 150 mg at night

Prophylaxis of duodenal ulcer
- **Adult: PO** 150 mg/day at bedtime

Gastroesophageal reflux
- **Adult and child ≥12 yr: PO** 150 mg bid × ≤12 wk, max 300 mg/day

Heartburn prevention
- **Adult: PO** 75 mg before eating bid

Renal dose
• **Adult: PO** CCr 20-50 ml/min, give 150 mg every other day; CCr <20 ml/min, give 150 mg q72hr
Available forms: Caps 150, 300 mg; tabs 75 mg
Administer:
• With meals for prolonged product effect; antacids 1 hr before or 1 hr after product; at bedtime if taken daily

SIDE EFFECTS

CNS: Headache, somnolence, confusion, abnormal dreams, dizziness
CV: Cardiac dysrhythmias, cardiac arrest
ENDO: Gynecomastia
GI: Elevated hepatic enzymes, hepatitis, jaundice, nausea
HEMA: Thrombocytopenia, agranulocytosis, aplastic anemia
INTEG: Pruritus, sweating, urticaria, exfoliative dermatitis
METAB: Hyperuricemia
MS: Myalgia
RESP: Bronchospasm, laryngeal edema, pneumonia

PHARMACOKINETICS

Partially metabolized by liver, excreted by kidneys, plasma half-life 1-2.8 hr, 70% absorbed orally, small amount (0.1% of plasma concentration) enters breast milk, 35% bound to plasma proteins

INTERACTIONS

Increase: GI obstruction risk—NIFEdipine (ext rel tabs)
Increase: effect of—mefloquine
Decrease: effect of—ketoconazole, itraconazole, atazanavir, cefditoren, cefpodoxime, delavirdine, gefitinib, raltegravir
Drug/Lab Test
Increase: ALT, AST, serum creatinine
False negative: allergy skin tests

NURSING CONSIDERATIONS

Assess:
• **GI pain:** epigastric, abdominal, character, alleviating factors, hematemesis, occult blood in stool, heartburn, GERD
Agranulocytosis: CBC with differential if patient receiving long-term therapy
Evaluate:
• Decreased GI pain, heartburn, GERD; resolution of gastric, duodenal ulcers
Teach patient/family:
• That gynecomastia, impotence may occur, are reversible
• To avoid driving or other hazardous activities until stabilized on product; that dizziness may occur
• To avoid black pepper, caffeine, alcohol, harsh spices, extremes in temp of food
• To avoid OTC preparations: aspirin, cough, cold preparations

TREATMENT OF OVERDOSE:

Symptomatic and supportive therapy is recommended; activated charcoal, emesis, or lavage may reduce absorption

HIGH ALERT

norepinephrine (Rx)

(nor-ep-i-nef'rin)
Levophed
Func. class.: Adrenergic
Chem. class.: Catecholamine

Do not confuse:
norepinephrine/EPINEPHrine

ACTION: Causes increased contractility and heart rate by acting on β-receptors in heart; also acts on α-receptors, thereby causing vasoconstriction in blood vessels; B/P is elevated, coronary blood flow improves, and cardiac output increases

USES: Acute hypotension, shock

CONTRAINDICATIONS: Hypersensitivity to this product or cyclopropane/halothane anesthesia, sulfites; ventricular fibrillation, tachydysrhythmias, pheochromocytoma, hypotension, hypovolemia

Precautions: Pregnancy (C), breast-feeding, geriatric patients, arterial embolism, peripheral vascular disease, hypertension, hyperthyroidism, cardiac disease

Black Box Warning: Extravasation

DOSAGE AND ROUTES

- **Adult: IV INF** 0.5-1 mcg/min titrated to B/P; maintenance 2-4 mcg/min; max 30 mcg/min
- **Child: IV INF** 0.1-0.2 mcg/kg/min titrated to B/P; max 2 mcg/kg/min

Available forms: Inj 1 mg/ml

Administer:

- Plasma expanders for hypovolemia

Continuous IV INF route

- Dilute with 500-1000 ml D_5W or D_5/0.9% NaCl; average dilution 4 mg/1000 ml diluent (4 mcg base/ml); give as inf 2-3 ml/min; titrate to response

Y-site compatibilities: Alfentanil, amikacin, amiodarone, anidulafungin, argatroban, ascorbic acid, atenolol, atracurium, atropine, aztreonam, benztropine, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, caspofungin, cefamandole, ceFAZolin, cefmetazole, cefonicid, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, ceftAZidime, ceftizoxime, ceftobiprole, ceftRIAXone, cefuroxime, cephalothin, chloramphenicol, chlorproMAZINE, cimetidine, cisatracurium, CISplatin, clindamycin, cloNIDine, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, DAPTOmycin, dexamethasone, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, doripenem, doxycycline, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, epoetin alfa, ertapenem, erythromycin, esmolol, etoposide, famotidine, fenoldopam, fentaNYL, fluconazole, fludarabine, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, heparin, hydrocortisone, HYDROmorphone, hydrOXYzine, IDArubicin, ifosfamide, imipenem-cilastatin, irinotecan, isoproterenol, ketorolac, labetalol, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, meperidine, meropenem, metaraminol, methicillin, methotrexate, methoxamine, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, mezlocillin, micafungin, miconazole, midazolam, milrinone, minocycline, mitoXANtrone, morphine, moxalactam, multiple vitamins injection, mycophenolate, nafcillin, nalbuphine, naloxone, netilmicin, niCARdipine, nitroglycerin, nitroprusside, octreotide, ondansetron, oxacillin, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pamidronate, pancuronium, papaverine, PEMEtrexed, penicillin G potassium/sodium, pentamidine, pentazocine, phenylephrine, phytonadione, piperacillin, piperacillin-tazobactam, polymyxin B, potassium chloride, procainamide, prochlorperazine, promethazine, propofol, propranolol, protamine, pyridoxine, quiNIDine, ranitidine, remifentanil, ritodrine, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiamine, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, tobramycin, tolazoline, trimetaphan, urokinase, vancomycin, vasopressin, vecuronium, verapamil, vinCRIStine, vinorelbine, vitamin B complex with C, voriconazole, zoledronic acid

SIDE EFFECTS

CNS: *Headache,* anxiety, dizziness, insomnia, restlessness, tremor, cerebral hemorrhage

CV: *Palpitations, tachycardia, hypertension, ectopic beats, angina*

GI: *Nausea, vomiting*

GU: Decreased urine output

INTEG: Necrosis, tissue sloughing with extravasation, gangrene

RESP: Dyspnea

SYST: Anaphylaxis

PHARMACOKINETICS

IV: Onset 1-2 min; metabolized in liver; excreted in urine (inactive metabolites); crosses placenta

INTERACTIONS

Increase: dysrhythmias—general anesthetics

• Incompatible with alkaline solutions: sodium, bicarbonate

• Severe hypertension: guanethidine

⚠ Do not use within 2 wk of MAOIs, antihistamines, ergots, methyldopa, oxytocics, tricyclics, guanethidine because hypertensive crisis may result

Increase: B/P—oxytocics

Increase: pressor effect—tricyclics, MAOIs

Decrease: norepinephrine action—α-blockers

NURSING CONSIDERATIONS

Assess:

• I&O ratio; notify prescriber if output <30 ml/hr

• B/P, pulse q2-3min after parenteral route, ECG during administration continuously; if B/P increases, product is decreased, CVP or PWP during inf if possible

• Paresthesias and coldness of extremities; peripheral blood flow may decrease

Black Box Warning: Extravasation: inj site: tissue sloughing

• Sulfite sensitivity, which may be life-threatening

Perform/provide:

• Storage of reconstituted sol in refrigerator ≤24 hr, protect from light, store unopened product at room temp, do not use discolored sol

Evaluate:

• Therapeutic response: increased B/P with stabilization, adequate tissue perfusion

Teach patient/family:

• About the reason for product administration; to report dyspnea, dizziness, chest pain

TREATMENT OF OVERDOSE:

Administer fluids, electrolyte replacement

norethindrone (Rx)

(nor-eth-in'drone)

Aygestin, Camila, Errin ✤, Heather, Jolivette, Micronor, Nora-BE, Nor-QD, Ortho Micronor

Func. class.: Progestogen

ACTION: Inhibits the secretion of pituitary gonadotropins, which prevents follicular maturation and ovulation; stimulates growth of mammary tissue; antineoplastic action against endometrial cancer

USES: Uterine bleeding (abnormal), amenorrhea, endometriosis, contraception

CONTRAINDICATIONS: Pregnancy (X), breast cancer, hypersensitivity, thromboembolic disorders, reproductive cancer, genital bleeding (abnormal, undiagnosed), liver tumors, hepatic disease

Precautions: Breastfeeding, hypertension, asthma, blood dyscrasias, CHF, diabetes mellitus, depression, migraine headache, seizure disorders, bone/gallbladder/renal/hepatic disease, family history of breast or reproductive tract cancer, smoking, HIV

DOSAGE AND ROUTES

Amenorrhea, abnormal uterine bleeding (Aygestin)

• **Adult: PO** 2.5-10 mg/day on days 5-25 of menstrual cycle

Endometriosis (Aygestin)

• **Adult: PO** 5 mg/day × 2 wk then increased by 2.5 mg/day × 2 wk up to 15 mg/day, may continue for 6-9 mo

Contraception

• **Adult: PO** 0.35 mg on 1st day of menses then 0.35 mg/day

N

Available forms: Tabs (Aygestin) 5 mg; tabs 0.35 mg

Administer:

- Titrated dose; use lowest effective dose
- One dose in AM; do not interrupt between pill packs, give at roughly same time of day
- Without regard to meals

SIDE EFFECTS

CNS: *Dizziness, headache,* migraines, depression, fatigue

CV: Hypotension, thrombophlebitis, edema, thromboembolism, CVA, stroke, PE, MI

EENT: Diplopia

GI: *Nausea,* vomiting, anorexia, cramps, increased weight, cholestatic jaundice

GU: Amenorrhea, cervical erosion, breakthrough bleeding, dysmenorrhea, vaginal candidiasis, breast changes, (gynecomastia, testicular atrophy, impotence), endometriosis, spontaneous abortion, *breast tenderness*

INTEG: Rash, urticaria, acne, hirsutism, alopecia, oily skin, seborrhea, purpura, melasma

META: Hyperglycemia

PHARMACOKINETICS

Duration 24 hr, excreted in urine, feces; metabolized in liver

INTERACTIONS

Decrease: progestin effect—barbiturates, carBAMazepine, fosphenytoin, phenytoin, rifampin

Drug/Herb

Decrease: contraception—St. John's wort

Drug/Food

Increase: caffeine level—caffeine

Drug/Lab Test

Increase: LDL

Decrease: GTT, HDL, alk phos

NURSING CONSIDERATIONS

Assess:

- Weight daily: notify prescriber of weekly weight gain >5 lb
- B/P at beginning of treatment and periodically
- I&O ratio; be alert for decreasing urinary output, increasing edema
- Hepatic studies: ALT, AST, bilirubin periodically during long-term therapy
- Edema, hypertension, cardiac symptoms, jaundice, thromboembolism
- Mental status: affect, mood, behavioral changes, depression
- Hypercalcemia
- Breast exam, pap smear

Perform/provide:

- Storage in dark area

Evaluate:

- Therapeutic response: decreased abnormal uterine bleeding, absence of amenorrhea

Teach patient/family:

- About cushingoid symptoms
- ⚠ To report breast lumps, vaginal bleeding, amenorrhea, edema, jaundice, dark urine, clay-colored stools, dyspnea, headache, blurred vision, abdominal pain, numbness or stiffness in legs, chest pain; impotence or gynecomastia (men)
- To take at same time of day; not to interrupt between pill packs
- To report suspected pregnancy immediately, to wait ≥3 mo after stopping product to become pregnant, (X), use backup contraception methods for 48 hr, if treatment is not begun on the first day of menstruation
- To avoid smoking; CV reactions may occur
- That product does not protect against HIV, STDs
- That product may mask onset of menopause

norfloxacin ophthalmic
See Appendix B

nortriptyline (Rx)

(nor-trip'ti-leen)

Arentyl ✤, Pamelor

Func. class.: Antidepressant, tricyclic

Chem. class.: Dibenzocycloheptene—secondary amine

Do not confuse:
nortriptyline/amitriptyline

ACTION: Blocks reuptake of norepinephrine and serotonin into nerve endings, thereby increasing action of norepinephrine and serotonin in nerve cells

USES: Major depression
Unlabeled uses: Chronic pain management, PMDD, social phobia, neuropathy, panic disorder, enuresis, migraine prophylaxis

CONTRAINDICATIONS: Pregnancy (D), hypersensitivity to tricyclics, recovery phase of MI, seizure disorders, prostatic hypertrophy
Precautions: Breastfeeding, suicidal patients, severe depression, increased intraocular pressure, closed-angle glaucoma, urinary retention, cardiac/hepatic disease, hyperthyroidism, electroshock therapy, elective surgery

Black Box Warning: Children, suicidal ideation

DOSAGE AND ROUTES

- **Adult: PO** 25 mg tid or qid; may increase to 150 mg/day; may give daily dose at bedtime
- **Adolescent: PO** 1-3 mg/kg/day in 3-4 divided doses or daily at bedtime, max 150 mg/day
- **Child 6-12 yr (unlabeled): PO** 1-3 mg/kg/day in 3-4 divided doses, max 150 mg/day
- **Geriatric: PO** 10-25 mg at bedtime, increase by 10-25 mg at weekly intervals to desired dose; usual maintenance 75 mg/day, max 150 mg/day

Available forms: Caps 10, 25, 50, 75 mg; sol 10 mg/5 ml
Administer:
- Increased fluids, bulk in diet if constipation occurs
- Without regard to meals
- Dosage at bedtime for oversedation during day; may take entire dose at bedtime; geriatric patients may not tolerate once daily dosing
- Gum, hard candy, frequent sips of water for dry mouth
- **Oral solution:** with fruit juice, water, or milk to disguise taste

SIDE EFFECTS

CNS: *Dizziness, drowsiness,* confusion, headache, anxiety, tremors, stimulation, weakness, insomnia, nightmares, EPS (geriatric patients), increased psychiatric symptoms, seizures
CV: *Orthostatic hypotension, ECG changes, tachycardia,* hypertension, palpitations, dysrhythmias
EENT: *Blurred vision,* tinnitus, mydriasis
GI: *Constipation, dry mouth,* nausea, vomiting, paralytic ileus, increased appetite, cramps, epigastric distress, jaundice, hepatitis, stomatitis
GU: *Urinary retention,* acute renal failure
HEMA: Agranulocytosis, thrombocytopenia, eosinophilia, leukopenia
INTEG: Rash, urticaria, sweating, pruritus, photosensitivity

PHARMACOKINETICS

PO: Steady state 4-19 days; metabolized by liver; excreted by kidneys; crosses placenta; excreted in breast milk; half-life 18-28 hr, protein binding 93%-95%

INTERACTIONS

⚠ **Increase:** QT prolongation—class IA/III antidysrhythmics, some phenothiazines, β agonists, local anesthetics, tricyclics, haloperidol, chloroquine, droperidol, pentamidine; CYP3A4 inhibitors (amiodarone, clarithromycin, erythromycin, telithromycin, troleandomycin), ar-

N

senic trioxide, levomethadyl; CYP3A4 substrates (methadone, pimozide, QUEtiapine, quiNIDine, risperiDONE, ziprasidone)
• Heavy smoking: decreased product effect
⚠ Hyperpyretic crisis, seizures, hypertensive episode: MAOI
Increase: effects of direct-acting sympathomimetics (EPINEPHrine), alcohol, barbiturates, benzodiazepines, CNS depressants, products increasing QT interval, other anticholinergics
⚠ **Increase:** serotonin syndrome, neuroleptic malignant syndrome—SSRIs, SNRIs, serotonin receptor agonists, linezolid; methylene blue (IV)
Decrease: effects of guanethidine, cloNIDine, indirect-acting sympathomimetics (ePHEDrine)

Drug/Herb
Increase: CNS effect—kava, valerian
Decrease: nortriptyline level—St. John's wort

Drug/Lab Test
Increase: serum bilirubin, blood glucose, alk phos
Decrease: VMA, 5-HIAA
False increase: urinary catecholamines

NURSING CONSIDERATIONS

Assess:

Black Box Warning: **Suicidal thoughts/behaviors in children/young adults:** not approved for children, monitor for suicidal ideation in depression, adolescents, young adults

• B/P (lying, standing), pulse q4hr; if systolic B/P drops 20 mm Hg, hold product, notify prescriber; VS q4hr in patients with CV disease
• Blood studies: CBC, leukocytes, differential, cardiac enzymes if patient is receiving long-term therapy
• Hepatic studies: AST, ALT, bilirubin
• Weight weekly; appetite may increase with product
⚠ **PR, QT prolongation:** ECG for flattening of T wave, bundle branch block, AV block, QT prolongation, dysrhythmias in cardiac patients; assess for chest pain, palpitations, dyspnea
• EPS primarily in geriatric patients: rigidity, dystonia, akathisia, preferred tricyclic in geriatric patients
• Mental status changes: mood, sensorium, affect, suicidal tendencies, increase in psychiatric symptoms, depression, panic
• Urinary retention, constipation; constipation is more likely to occur in children
⚠ **Withdrawal symptoms:** headache, nausea, vomiting, muscle pain, weakness; do not usually occur unless product was discontinued abruptly
• Alcohol intake; if alcohol is consumed, hold dose until AM
• **Serotonin syndrome, neuroleptic malignant syndrome:** assess for increased heart rate, shivering, sweating, dilated pupils, tremors, high B/P, hyperthermia, headache, confusion; if these occur, stop product, administer serotonin antagonist if needed **(rare)**

Perform/provide:
• Storage in tight, light-resistant container at room temp
• Assistance with ambulation during beginning therapy because drowsiness/dizziness occurs; safety measures including side rails, primarily for geriatric patients

Evaluate:
• Therapeutic response: decreased depression

Teach patient/family:
• That therapeutic effects may take 2-3 wk, only small quantities may be dispersed
• To use caution when driving, during other activities requiring alertness because of drowsiness, dizziness, blurred vision
• To avoid alcohol ingestion, other CNS depressants; to avoid MAOIs within 14 days
• Not to discontinue medication quickly after long-term use; may cause nausea, headache, malaise
• To wear sunscreen or large hat because photosensitivity occurs
⚠ To immediately report urinary retention, worsening depression, suicidal thoughts/behaviors

TREATMENT OF OVERDOSE: ECG monitoring; lavage, activated charcoal; administer anticonvulsant

nystatin (Rx)

(nye-stat'in)

Bio-Statin, Pediaderm AF, Nyamyc

Func. class.: Antifungal

Chem. class.: Amphoteric polyene

ACTION: Interferes with fungal DNA replication; binds sterols in fungal cell membrane, which increases permeability, leaking of cell nutrients

USES: *Candida* species causing oral, intestinal infections

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (C)

DOSAGE AND ROUTES

Oral infection

• **Adult/adolescent/child:** **SUSP** 400,000-600,000 units qid, use ½ dose in each side of mouth, swish and swallow, use for at least 48 hr after symptoms resolved

• **Infant:** **SUSP** 200,000 units qid (100,000 units in each side of mouth)

• **Newborn and premature infant:** **SUSP** 100,000 units qid

• **Adult/child:** **TROCHES** 200,000-400,000 units qid × ≤2 wk

GI infection

• **Adult:** **PO** 500,000-1,000,000 units tid

Cutaneous candidiasis

• **Adult/child:** **Top cream/ointment** apply to affected area bid; **powder** apply to affected area bid-tid

Vaginal candidiasis

• **Adult vag tab:** 100,000 units daily at bedtime × 14 days

Available forms: Tabs 500,000 units; powder for oral susp 50 million, 150 million, 500 million; susp 100,000 units per ml; oral caps 500,000, 1,000,000 units, bulk powder

Administer:

PO route

• Oral susp dose by placing ½ in each cheek, then swallow; do not mix with food

• Topical dose after cleansing area; mouth may be swabbed; very moist lesions best treated with topical powder

SIDE EFFECTS

GI: Nausea, vomiting, anorexia, diarrhea, cramps

INTEG: Rash, urticaria (rare)

PHARMACOKINETICS

PO: Little absorption, excreted in feces

NURSING CONSIDERATIONS

Assess:

• **Allergic reaction:** rash, urticaria, irritated oral mucous membranes; product may have to be discontinued

• Obtain culture, histologic tests to confirm organism

• Predisposing factors: antibiotic therapy, pregnancy, diabetes mellitus, sexual partner infection (vaginal infections)

Perform/provide:

• Storage at room temp for oral susp; tabs in tight, light-resistant containers at room temp

Evaluate:

• Therapeutic response: culture negative for *Candida*

Teach patient/family:

• That long-term therapy may be needed to clear infection; to complete entire course of medication

• To avoid commercial mouthwashes for mouth infection

• To shake susp before measuring each dose

• To notify prescriber of irritation; product may have to be discontinued

nystatin topical

See Appendix B

nystatin vaginal antifungal

See Appendix B

octreotide (Rx)

(ok-tree'oh-tide)

SandoSTATIN, SandoSTATIN LAR Depot

Func. class.: Growth hormone, antidiarrheal

Chem. class.: Synthetic octapeptide

ACTION: A potent growth hormone similar to somatostatin

USES: **SandoSTATIN:** acromegaly, improves symptoms of carcinoid tumors, vasoactive intestinal peptide tumors (VIPomas); **LAR Depot:** long-term maintenance of acromegaly, carcinoid tumors, VIPomas

Unlabeled uses: GI fistula, variceal bleeding, diarrheal conditions, pancreatic fistula, irritable bowel syndrome, dumping syndrome, short bowel syndrome, insulinoma, hepatorenal syndrome

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, diabetes mellitus, hypothyroidism, renal disease

DOSAGE AND ROUTES

Acromegaly

• **Adult: SUBCUT/IV** (SandoSTATIN) 50-100 mcg bid-tid, adjust q2wk based on growth hormone levels or **IM** (SandoSTATIN LAR) 20 mg q4wk × 3 mo, adjust based on growth hormone levels

VIPomas

• **Adult: SUBCUT/IV** (SandoSTATIN) 200-300 mcg/day in 2-4 doses for 2 wk, or **IM** (SandoSTATIN LAR) 20 mg q4wk × 2 mo, adjust dose

Flushing/diarrhea in carcinoid tumors

• **Adult: SUBCUT/IV** (SandoSTATIN) 100-600 mcg/day in 2-4 doses for 2 wk, titrated to patient response or **IM** (SandoSTATIN LAR) 20 mg q4wk × 2 mo, adjust dose

GI fistula

• **Adult: SUBCUT** (SandoSTATIN) 50-200 mcg q8hr

Antidiarrheal in AIDS patients (unlabeled)

• **Adult: SUBCUT** (SandoSTATIN) 50 mcg q8hr prn, increase to 500 mcg q8hr

Irritable bowel syndrome (unlabeled)

• **Adult: SUBCUT** (SandoSTATIN) 100 mcg in single dose, up to 125 mcg bid

Dumping syndrome (unlabeled)

• **Adult: SUBCUT** (SandoSTATIN) 50-150 mcg/day

Variceal bleeding (unlabeled)

• **Adult: IV** (SandoSTATIN) 25-50 mcg/hr **CONT IV INF** for 18 hr-5 days

Available forms: Inj (SandoSTATIN) 0.05, 0.1, 0.2, 0.5, 1 mg/ml; inj powder for susp (LAR depot) 10, 20, 30 mg/5 ml

Administer:

IM route

• Reconstitute with diluent provided; give in gluteal region

SUBCUT route

• Rotate inj site; use hip, thigh, abdomen

• Avoid using medication that is cold; allow to reach room temp; do not use LAR depot

IV route

• **IV direct:** give over 3 min; during an emergency carcinoid crisis, give rapid bolus

• **Intermittent IV inf:** dilute in 50-200 ml D_5W, 0.9% NaCl; give over 15-30 min

Y-site compatibilities: Acyclovir, alfentanil, allopurinol, amifostine, amikacin, aminocaproic acid, aminophylline, amiodarone, amphotericin B colloidal, amphotericin B lipid complex, amphotericin B liposome, ampicillin, ampicillin-sulbactam, anidulafungin, argatroban, arsenic trioxide, atenolol, atra-

curium, azithromycin, aztreonam, bivalirudin, bleomycin, bumetanide, buprenorphine, busulfan, butorphanol, calcium chloride/gluconate, capreomycin, CARBOplatin, carmustine, caspofungin, ceFAZolin, cefepime, cefotaxime, cefoTEtan, cefOXitin, cefTAZidime, ceftizoxime, cefTRIAXone, cefuroxime, chloramphenicol, chlorproMAZINE, cimetidine, ciprofloxacin, cisatracurium, CISplatin, clindamycin, cyclophosphamide, cycloSPORINE, cytarabine, dacarbazine, DACTINomycin, DAPTOmycin, DAUNOrubicin, DAUNOrubicin liposome, dexamethasone, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, dolasetron, DOPamine, DOXOrubicin, DOXOrubicin liposomal, doxycycline, droperidol, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, eptifibatide, ertapenem, erythromycin, esmolol, etoposide, famotidine, fenoldopam, fentaNYL, fluconazole, fludarabine, fluorouracil, foscarnet, fosphenytoin, furosemide, gallium nitrate, ganciclovir, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, haloperidol, heparin, hydrALAZINE, hydrocortisone, HYDROmorphone, hydrOXYzine, IDArubicin, ifosfamide, imipenem-cilastatin, insulin (regular), irinotecan, isoproterenol, ketorolac, labetalol, lansoprazole, leucovorin, levofloxacin, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, melphalan, meperidine, meropenem, mesna, methohexital, methotrexate, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, midazolam, milrinone, minocycline, mitoMYcin, mitoXANtrone, mivacurium, morphine, moxifloxacin, mycophenolate, nafcillin, nalbuphine, naloxone, nesiritide, niCARdipine, nitroglycerin, nitroprusside, norepinephrine, ondansetron, oxaliplatin, PACLitaxel, palonosetron, pamidronate, pancuronium, PEMEtrexed, pentamidine, pentazocine, PENTobarbital, PHENobarbital, phenylephrine, piperacillin, piperacillin-tazobactam, polymyxin B, potassium acetate/chloride/phosphates, procainamide, prochlorperazine, promethazine, propranolol, quiNIDine, quinupristin-dalfopristin, ranitidine, remifentanil, rocuronium, sodium acetate/bicarbonate/phosphates, streptozocin, succinylcholine, SUFentanil, sulfamethoxazole-trimethoprim, tacrolimus, teniposide, thiopental, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, tobramycin, topotecan, vancomycin, vasopressin, vecuronium, verapamil, vinBLAStine, vinCRIStine, vinorelbine, voriconazole, zidovudine, zoledronic acid

SIDE EFFECTS

CNS: *Headache, dizziness, fatigue, weakness,* depression, anxiety, tremors, seizure, paranoia

CV: *Sinus bradycardia, conduction abnormalities,* dysrhythmias, chest pain, SOB, thrombophlebitis, ischemia, CHF, hypertension, palpitations, QT prolongation, ST- or T-wave changes

ENDO: *Hypo/hyperglycemia, ketosis, hypothyroidism,* galactorrhea, diabetes insipidus

GI: *Diarrhea, nausea, abdominal pain, vomiting, flatulence, distention, constipation,* hepatitis, increased LFTs, GI bleeding, pancreatitis, cholelithiasis, ileus

GU: UTI

HEMA: Hematoma of inj site, bruise

INTEG: Rash, urticaria, pain; inflammation at inj site

MS: *Joint and muscle pain*

PHARMACOKINETICS

Absorbed rapidly, completely; peak ½ hr (subcut/IV), 2-3 wk (IM); half-life 1.7 hr, duration 12 hr, excreted unchanged in urine

INTERACTIONS

⚠ Increase: QT prolongation—class IA/III antidysrhythmics, some phenothiazines, β agonists, local anesthetics, tricyclics, haloperidol, chloroquine, droperidol, pentamidine; CYP3A4 inhibitors

(amiodarone, clarithromycin, erythromycin, telithromycin, troleandomycin), arsenic trioxide, levomethadyl; CYP3A4 substrates (methadone, pimozide, QUEtiapine, quiNIDine, risperiDONE, ziprasidone)

Decrease: effect of—cycloSPORINE

Drug/Food

Decrease: absorption of dietary fat, vit B_{12} levels

Drug/Lab Test

Increase: glucose

Decrease: T_4, thyroid function tests, vit B12, glucose

NURSING CONSIDERATIONS

Assess:

• Growth hormone antibodies, IGF-1 at 1- to 4-hr intervals for 8-12 hr after dose **(acromegaly)**; 5-HIAA, plasma serotonin; blood glucose, serotonin levels **(carcinoid tumors)**, plasma substance P, plasma vasoactive intestinal peptide **(VIP) (VIPoma)**

• Thyroid function tests: T_3, T_4, T_7, TSH to identify hypothyroidism

• Fecal fat, serum carotene, somatomedin-C q 14 days, glucose; plasma serotonin levels (carcinoid tumors); plasma vasoactive intestinal peptide levels (VIPoma); serum growth hormone, serum IGF-1 baseline and periodically, diabetes to monitor blood glucose

• **Allergic reaction:** rash, itching, fever, nausea, wheezing

⚠ **Cardiac status:** bradycardia, conduction abnormalities, dysrhythmias; monitor ECG for QT prolongation, low voltage, axis shifts, early repolarization, R/S transition, early wave progression

• Gall bladder disease, pancreatitis: monitor closely

Perform/provide:

• Storage in refrigerator for unopened amps, vials or at room temp for 2 wk; protect from light; do not use discolored or cloudy sol

Evaluate:

• Therapeutic response: relief of diarrhea in patients with AIDS, improves symptoms of carcinoid or VIP tumors; data is insufficient regarding whether products decrease size/rate of tumor growth; decreasing symptoms of acromegaly

Teach patient/family:

• That regular assessments are required, diabetics to monitor blood glucose

• About SUBCUT inj if patient or other persons will be giving inj

⚠ That product may cause dizziness, drowsiness, weakness; to avoid hazardous activities if these occur; to report abdominal pain immediately

• That pregnancy may occur in acromegaly because fertility may be restored

• That in diabetes, to monitor glucose regularly

ofloxacin (Rx)

(o-flox′a-sin)

Func. class.: Antiinfective

Chem. class.: Fluoroquinolone

ACTION: Interferes with conversion of intermediate DNA fragments into high-molecular-weight DNA in bacteria; inhibits DNA gyrase

USES: Treatment of lower respiratory tract infections (pneumonia, bronchitis), genitourinary infections (prostatitis, UTIs) caused by *Escherichia coli, Klebsiella pneumoniae, Chlamydia trachomatis,* skin and skin-structure infections; otitis media, PID

Unlabeled uses: Leprosy, anthrax, epididymitis, meningococcal infection, prophylaxis, mycobacterium avium complex (MAC), plague, proctitis, traveler's diarrhea, typhoid fever

CONTRAINDICATIONS: QT prolongation, hypersensitivity to quinolones

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, renal disease, seizure disorders, excessive sunlight, hypokalemia

Black Box Warning: Tendon pain/rupture, tendinitis, myasthenia gravis

DOSAGE AND ROUTES

Lower respiratory tract infections/ skin and skin-structure infections
• **Adult: PO** 400 mg q12hr × 10 days
Cervicitis, urethritis
• **Adult: PO** 300 mg q12hr × 7 days (non-gonococcal); 400 mg as a single dose (Gonococcal)
Prostatitis from *E. coli*
• **Adult: PO** 300 mg q12hr × 6 wk
Urinary tract infection
• **Adult: PO** 200 mg q12hr × 3-7 days depending on organism 10 days (complicated)
Pelvic inflammatory disease
• **Adult: PO** 400 mg q12hr × 10-14 days
Renal dose
• **Adult: PO** CCr 10-50 ml/min, give q24hr; CCr <10 ml/min, give 50% of dose q24hr
Hepatic dose
• **Adult (Child-Pugh class C): PO** max 400 mg/day
Available forms: Tabs 200, 300, 400 mg
Administer:
PO route
• 2 hr before or 2 hr after antacids, calcium, iron, zinc products, without regard to food, maintain hydration

SIDE EFFECTS

CNS: *Dizziness, headache, fatigue, somnolence,* depression, insomnia, lethargy, malaise, seizures, vertigo
CV: QT prolongation, dysrhythmias, chest pain
EENT: Visual disturbances
GI: *Diarrhea, nausea, vomiting,* anorexia, flatulence, heartburn, dry mouth, increased AST, ALT, abdominal pain, constipation, pseudomembranous colitis, abnormal taste, xerostomia
HEMA: Blood dyscrasias
INTEG: Rash, pruritus, photosensitivity
MS: Tendinitis, tendon rupture, rhabdomyolysis
SYST: Anaphylaxis, Stevens-Johnson syndrome, toxic epidermal necrolysis

PHARMACOKINETICS

PO: Peak 1-2 hr; half-life 4-8 hr; steady state 2 days; excreted in urine as active product, metabolites; 90%-95% bioavailability

INTERACTIONS

Black Box Warning: Increase: tendon rupture/tendinitis—corticosteroids
• May alter blood glucose levels: antidiabetics
• Possible theophylline toxicity: theophylline
⚠ **Increase:** QT prolongation—class IA/III antidysrhythmics, some phenothiazines, β-agonists, local anesthetics, tricyclics, haloperidol, methadone, chloroquine, clarithromycin, droperidol, erythromycin, pentamidine
Increase: CNS stimulation, seizures—NSAIDs
Increase: anticoagulation—warfarin
Decrease: absorption—antacids with aluminum, magnesium, iron products, sucralfate, zinc products; separate by 2 hr

NURSING CONSIDERATIONS

Assess:
Black Box Warning: Tendon rupture/ tendinitis: more common in lung, heart, kidney transplants or geriatric patients; assess for pain or inflammation
• Blood studies: BUN, creatinine, AST, ALT, CBC, blood glucose
• **CNS symptoms:** insomnia, vertigo, headache, agitation, confusion
Black Box Warning: Myasthenia gravis: product may increase weakness, avoid use
• For overgrowth of infection in long-term treatment
• **Allergic reactions:** rash, flushing, urticaria, pruritus
Black Box Warning: Stop product if these occur
Perform/provide:
• Storage at room temp, protect from light

Evaluate:
• Therapeutic response: urine culture, absence of symptoms of infection
Teach patient/family:
• That if dizziness or lightheadedness occurs, to ambulate, perform activities with assistance
• To complete full course of therapy, take with plenty of fluids
• To avoid iron- or mineral-containing supplements within 2 hr before or after dose, take without regard to meals
• That allergic reactions usually occur after first dose but may occur later, stop product
• To avoid sun exposure, photosensitivity can occur

ofloxacin ophthalmic

See Appendix B

OLANZapine (Rx)

(oh-lanz'a-peen)

Zyprexa, Zyprexa IntraMuscular, Zyprexa Relprevv, Zyprexa Zydis

Func. class.: Antipsychotic, neuroleptic

Chem. class.: Thienobenzodiazepine

Do not confuse:
OLANZapine/osalazine
Zyprexa/Celexa/Zyrtec

ACTION: May mediate antipsychotic activity by both dopamine and serotonin type 2 (5-HT2) antagonists; may antagonize muscarinic receptors, histaminic (H_1)- and α-adrenergic receptors

USES: Schizophrenia, acute manic episodes with bipolar disorder, acute agitation
Unlabeled uses: Acute psychosis

CONTRAINDICATIONS: Hypersensitivity
Precautions: Pregnancy (C), breastfeeding, geriatric patients, hypertension, cardiac/renal/hepatic disease, diabetes, agranulocytosis, abrupt discontinuation, Asian patients, closed-angle glaucoma, coma, leukopenia, QT prolongation, tardive dyskinesia, torsades de pointes

Black Box Warning: Increased mortality in elderly patients with dementia-related psychosis, postinjection delirium/sedation syndrome

DOSAGE AND ROUTES

Schizophrenia
• **Adult: PO** 5-10 mg/day initially, may increase dosage by 5 mg at ≥1 wk intervals; **ORALLY DISINTEGRATING** tabs: open blister pack, place tab on tongue, let disintegrate, swallow, max 20 mg/day
• **Geriatric: PO** 5 mg, may increase cautiously at 1-wk intervals, max 20 mg/day
• **Adolescent: PO** 2.5 or 5 mg/day, target 10 mg/day
• **Child 6-12 yr (unlabeled): PO** 2.5 mg daily, may increase to 5 mg/day after 4-7 days
Bipolar mania
• **Adult: PO** 10-15 mg/day, may increase dose after >24 hr by 5 mg, max 20 mg/day
• **Adolescent: PO** 2.5 or 5 mg/day, target 10 mg/day, max 20 mg/day
Agitation associated with schizophrenia, bipolar I mania
• **Adult: IM** 10 mg
Severe behavioral disturbances in geriatric patients (unlabeled)
• **Adult: PO** 2.5-5 mg/day; **acute psychosis PO** 5-10 mg every night
Available forms: Tab 2.5, 5, 7.5, 10, 15, 20 mg; **orally disintegrating tabs** 5, 10, 15, 20 mg (Zyprexia Zydis); **powder for inj** 10 mg; **ext rel powder for susp for inj** 210, 300, 405 mg (Zyprexa Relprevv)
Administer:
• Decreased dose in geriatric patients
PO route
• With full glass of water, milk, food to decrease GI upset
• **Orally disintegrating tabs:** open blister pack; place tab on tongue until

dissolved; swallow; no water needed, do not break, crush, chew

IM route (Zyprexa Intramuscular)

- Dissolve contents of vials with 2.1 ml sterile water for inj (5 mg/ml), use immediately
- Do not use IV or SUBCUT
- Inject slowly, deep into muscle mass

IM route (Zyprexa Relprevv)

Black Box Warning: Available only through restricted distribution program due to postinjection delirium/sedation syndrome, given at a facility with emergency services, continuous observation

- Use deep IM gluteal inj only
- Use only diluent provided in kit; give q2-4wk using 19G, 1.5-inch needle in kit, for obese patients, use 19G, 2-inch or larger needle

SIDE EFFECTS

CNS: EPS: (pseudoparkinsonism, akathisia, dystonia, tardive dyskinesia), seizures, headache, neuroleptic malignant syndrome (rare), agitation, nervousness, hostility, *dizziness*, hypertonia, *tremor*, euphoria, confusion, *drowsiness*, fatigue, *abnormal gait, insomnia, fever*

CV: Hypotension, tachycardia, chest pain, heart failure, sudden death (geriatric patients, IM), orthostatic hypotension, peripheral edema

ENDO: Increased prolactin levels, hypo/hyperglycemia

GI: *Dry mouth, nausea, vomiting, appetite, dyspepsia,* anorexia, *constipation,* abdominal pain, *weight gain,* jaundice, hepatitis

GU: Urinary retention, urinary frequency, enuresis, impotence, amenorrhea, gynecomastia, breast engorgement, premenstrual syndrome

HEMA: Neutropenia

INTEG: Rash

MISC: Peripheral edema, accidental injury, hypertonia, hyperlipidemia

MS: *Joint pain,* twitching

RESP: *Cough, pharyngitis;* fatal pneumonia (geriatric patients, IM)

PHARMACOKINETICS

Well absorbed (60%), metabolized by liver, glucuronidation/oxidation by CYP1A2 and CYP2D6; excreted in urine (57%), feces (30%); 93% bound to plasma proteins; half-life 21-54 hr, extended in geriatric patients; clearance decreased in women, increased in smokers, peak PO 6 hr, IM 15-45 min

INTERACTIONS

⚠ Increase: serotonin syndrome, neuroleptic malignant syndrome—SSRIs, SNRIs

Increase: sedation—other CNS depressants, alcohol, barbiturate anesthetics, antihistamines, sedatives/hypnotics, antidepressants

Increase: OLANZapine levels—CYP1A2 inhibitors (fluvoxaMINE)

Increase: hypotension—antihypertensives, alcohol, diazepam

Increase: anticholinergic effects—anticholinergics

Decrease: OLANZapine levels—CYP1A2 inducers: carBAMazepine, omeprazole, rifampin

Decrease: antiparkinson activity—levodopa, bromocriptine, other DOPamine agonists

Drug/Lab Test

Increase: LFTs, prolactin, CPK

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Postinjection delirium/sedation syndrome (Zyprexa Relprevv); monitor continuously for ≥3 hr after injection; patient must be accompanied when leaving: sedation, coma, delirium, EPS, slurred speech, altered gait aggression, dizziness, weakness, hypertension, seizures; before leaving, confirm that patient is alert, oriented, and free of any other symptoms

- Mental status: orientation, mood, behavior, presence of hallucinations and type before initial administration, monthly; EPS, including akathisia (in-

ability to sit still, no pattern to movements), tardive dyskinesia (bizarre movements of jaw, mouth, tongue, extremities), pseudoparkinsonism (rigidity, tremors, pill rolling, shuffling gait)
• I&O ratio; palpate bladder if low urinary output occurs, urinary retention may be cause, especially in geriatric patients
• Bilirubin, CBC
• Urinalysis recommended before, during prolonged therapy
• Affect, orientation, LOC, reflexes, gait, coordination, sleep pattern disturbances
• B/P sitting, standing, lying: take pulse, respirations q4hr during initial treatment; establish baseline before starting treatment; report drops of 30 mm Hg; obtain baseline ECG
• Dizziness, faintness, palpitations, tachycardia on rising
⚠ **Geriatric patients for serious reactions:** fatal pneumonia, heart failure, stroke leading to death (IM)
⚠ **Neuroleptic malignant syndrome:** hyperpyrexia, muscle rigidity, increased CPK, altered mental status, for acute dystonia (check chewing, swallowing, eyes, pill rolling)
• Constipation, urinary retention daily; increase bulk, water in diet
• Weight gain, hyperglycemia, metabolic changes in diabetic patients

Perform/provide:
• Supervised ambulation until patient stabilized on medication; do not involve patient in strenuous exercise program because fainting is possible; patient should not stand still for long periods
• Storage in tight, light-resistant container

Evaluate:
• Therapeutic response: decrease in emotional excitement, hallucinations, delusion, paranoia, reorganization of patterns of thought, speech

Teach patient/family:

Black Box Warning: About postinjection delirium/sedation syndrome: teach about all symptoms

• To use good oral hygiene; frequent rinsing of mouth, sugarless gum, candy, ice chips for dry mouth
• To avoid hazardous activities until product response is determined
• That orthostatic hypotension occurs often; to rise from sitting or lying position gradually
• To avoid hot tubs, hot showers, tub baths because hypotension may occur
• To avoid abrupt withdrawal of this product because EPS may result; product should be withdrawn slowly
• To avoid OTC preparations (cough, hay fever, cold) unless approved by prescriber because serious product interactions may occur; to avoid use with alcohol, CNS depressants because increased drowsiness may occur
• That in hot weather, heat stroke may occur; to take extra precautions to stay cool

TREATMENT OF OVERDOSE: Lavage if orally ingested; provide airway; do not induce vomiting or use EPINEPHrine

olmesartan (Rx)

(ol-meh-sar'tan)

Benicar

Func. class.: Antihypertensive

Chem. class.: Angiotensin II receptor (type AT_1) antagonist

ACTION: Blocks the vasoconstrictor and aldosterone-secreting effects of angiotensin II; selectively blocks the binding of angiotensin II to the AT_1 receptor found in tissues

USES: Hypertension, alone or in combination with other antihypertensives

CONTRAINDICATIONS: Hypersensitivity, pregnancy 2nd/3rd trimesters (D)

Precautions: Pregnancy (C) 1st trimester, breastfeeding, children, geriatric patients, hepatic disease, CHF

DOSAGE AND ROUTES

• **Adult: PO** Single agent 20 mg/day initially in patients who are not volume depleted, may be increased to 40 mg/day if needed after 2 wk
• **Child ≥6 yr/adolescents ≤16 yr weighing ≥35 kg: PO** 20 mg/day, may increase to max 40 mg/day after 2 wk
• **Child ≥6 yr/adolescents ≤16 yr weighing 20-<35 kg: PO** 10 mg daily, may increase to max 20 mg/day after 2 wk
Available forms: Tabs 5, 20, 40 mg
Administer:
• Without regard to meals, refrigerate susp and store up to 1 mo, shake susp before use

SIDE EFFECTS

CNS: *Dizziness,* fatigue, headache, insomnia
CV: Chest pain, peripheral edema, tachycardia
EENT: Sinusitis, rhinitis, pharyngitis
GI: *Diarrhea,* abdominal pain
MS: Arthralgia, pain
RESP: *Upper respiratory infection,* bronchitis
SYST: Angioedema

PHARMACOKINETICS

Peak 1-2 hr; excreted in urine, feces; half-life 13 hr; protein binding 99%

INTERACTIONS

Increase: antihypertensive effects—other antihypertensives, diuretics
Increase: hyperkalemia—potassium supplements, potassium-sparing diuretics
Increase: effect of lithium, antioxidants
Decrease: antihypertensive effect—NSAIDs, colesevelan
Drug/Herb
Increase: antihypertensive effect—hawthorn
Decrease: antihypertensive effect—ephedra

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Pregnancy; product can cause fetal death when given during pregnancy (D) 2nd/3rd trimesters

• Response, adverse reactions, especially in renal disease
• **Hypertension:** B/P, pulse q4hr; note rate, rhythm, quality; electrolytes: sodium, potassium, chloride; baselines for renal, hepatic studies before therapy begins
• **Hypotension:** place supine, may occur with hyponatremia or those with volume depletion, more common in those taking a diuretic also
Evaluate:
• Therapeutic response: decreased B/P
Teach patient/family:
• To comply with dosage schedule, even if feeling better
• To notify prescriber of mouth sores, fever, swelling of hands or feet, irregular heartbeat, chest pain
• That excessive perspiration, dehydration, vomiting, diarrhea may lead to fall in B/P; to consult prescriber if these occur
• That product may cause dizziness, fainting, lightheadedness
• To rise slowly to sitting or standing position to minimize orthostatic hypotension

Black Box Warning: To notify prescriber immediately if pregnant; not to use during breastfeeding

• To avoid all OTC medications unless approved by prescriber
• That blood glucose may increase and antidiabetic product may need dosage change
• To inform all health care providers of medication use
• To use proper technique for obtaining B/P, acceptable parameters

O

olopatadine nasal agent

See Appendix B

olopatadine ophthalmic

See Appendix B

olsalazine (Rx)

(ohl-sal'ah-zeen)

Dipentum

Func. class.: Antiinflammatory

Chem. class.: Salicylate derivative

Do not confuse:
olsalazine/OLANZapine

ACTION: Bioconverted to 5-aminosalicylic acid, which decreases inflammation

USES: Maintenance of remission of ulcerative colitis in patients intolerant to sulfasalazine

CONTRAINDICATIONS: Hypersensitivity to this product or salicylates
Precautions: Pregnancy (C), breastfeeding, children <14 yr; impaired renal/hepatic function; severe allergy; bronchial asthma

DOSAGE AND ROUTES

• **Adult: PO** 500 mg bid, max 3 g/day
Available forms: Caps 250 mg
Administer:
• Total daily dose evenly spaced to minimize GI intolerance, give with food

SIDE EFFECTS

CNS: Headache, hallucinations, depression, vertigo, fatigue, dizziness
GI: Nausea, vomiting, abdominal pain, hepatitis, diarrhea, bloating, pancreatitis
HEMA: Leukopenia, neutropenia, thrombocytopenia, agranulocytosis, anemia
INTEG: Rash, dermatitis, urticaria

PHARMACOKINETICS

Partially absorbed, peak 1½ hr, half-life 30-90 min (rectal), 2-15 hr (PO), excreted in urine as 5-aminosalicylic acid and metabolites, crosses placenta

INTERACTIONS

Increase: azaTHIOprine toxicity—azaTHIOprine
Increase: myelosuppression—mercaptopurine, thioguanine
Increase: PT, INR—warfarin
Drug/Lab Test
Increase: AST, ALT

NURSING CONSIDERATIONS

Assess:
• **Colitis:** bowel pattern, number of stools, consistency, frequency, pain, mucus before treatment and periodically
⚠ **Blood dyscrasias:** skin rash, fever, sore throat, bruising, bleeding, fatigue, joint pain (rare); CBC before treatment and periodically
• **Allergic reaction:** rash, dermatitis, urticaria, pruritus, dyspnea, bronchospasm; allergy to salicylates
Perform/provide:
• Storage in tight, light-resistant container at room temp
Evaluate:
• Therapeutic response: absence of fever, mucus in stools, decreased diarrhea, abdominal pain
Teach patient/family:
• To report diarrhea, rash, bleeding, bruising, fever, hallucinations
• That product may cause dizziness; to avoid hazardous activities until reaction is known
• To take even if feeling better; to take as directed; to take missed dose when remembered; but not to double

omalizumab (Rx)

(oh-mah-lye-zoo'mab)

Xolair

Func. class.: Antiasthmatic

Chem. class.: Monoclonal antibody

ACTION: Recombinant DNA-derived humanized IgG murine monoclonal antibody that selectively binds to IgE to limit the release of mediators in the allergic response

USES: Moderate to severe persistent asthma

Unlabeled uses: Seasonal allergic rhinitis, food allergy

CONTRAINDICATIONS: Hypersensitivity to hamster protein

Black Box Warning: Hypersensitivity to this product

Precautions: Pregnancy (B), breastfeeding, children <12 yr, acute attacks of asthma, lymphoma, nephrotic disease, bronchospasm, neoplastic disease, status asthmatics

DOSAGE AND ROUTES

• **Adult/adolescent/child ≥12 yr: SUBCUT** 150-375 mg × 2-4 wk, divide inj into 2 sites if dose >150 mg; dose is adjusted based on IgE levels, significant changes in body weight

Available forms: Powder for inj, lyophilized 202.5 mg (150 mg/1.2 ml after reconstitution)

Administer:

SUBCUT route

• Reconstitute using 1.4 ml sterile water for inj (150 mg/1.2 ml or 125 mg/ml); gently swirl to dissolve; allow vial to stand and q5min gently swirl for 5-10 sec to dissolve, some vials may take ≥20 min, do not use if contents do not dissolve within 40 min, should be clear or slightly opalescent; use large-bore needle to withdraw medication; replace needle with small-bore needle

• Given q2-4wk; product is viscous; if >150 mg is given, divide into 2 sites; inj may take 5-10 sec to administer

SIDE EFFECTS

CV: Heart failure, cardiomyopathy, hypotension

HEMA: Serious systemic eosinophilia

INTEG: Pruritus, dermatitis, inj site reactions, rash

MISC: Earache, dizziness, fatigue, pain, malignancies, viral infections, anaphylaxis, thrombocytopenia, headache

MS: Arthralgia, fracture, leg, arm pain

RESP: Sinusitis, upper respiratory infections, pharyngitis, pulmonary hypertension, bronchospasm

PHARMACOKINETICS

Slowly absorbed, peak 7-8 days, half-life 26 days, degradation by liver, excretion in bile

INTERACTIONS

• Use cautiously with live virus vaccines

Drug/Lab Test

Increase: IgE

NURSING CONSIDERATIONS

Assess:

• **Asthma:** respiratory rate, rhythm, depth; auscultate lung fields bilaterally; notify prescriber of abnormalities; monitor pulmonary function tests; serum IgE (may increase and continue for 1 year)

• **Inj site reactions:** inflammation, edema, redness, warmth at site; may occur within 60 min of inj, may decrease with repeated dosing

Black Box Warning: Anaphylaxis, allergic reactions: rash, urticaria, inability to breathe, edema of throat; product should be discontinued; have emergency equipment available, observe for 2 hr, reaction can occur ≤24 hr

Evaluate:

• Therapeutic response: ability to breathe more easily

Teach patient/family:
- That improvement will not be immediate
- Not to stop taking or decrease current asthma medications unless instructed by prescriber
- To avoid live virus vaccines while taking this product

Black Box Warning: To report signs of allergic reaction

omeprazole (OTC, Rx)

(oh-mep'ray-zole)

Good Sense Omeprazole, Losec ✦, PriLOSEC, PriLOSEC OTC

Func. class.: Antiulcer, proton pump inhibitor

Chem. class.: Benzimidazole

Do not confuse:
PriLOSEC/Prinivil/PROzac/predniSONE

ACTION: Suppresses gastric secretion by inhibiting hydrogen/potassium ATPase enzyme system in gastric parietal cells; characterized as gastric acid pump inhibitor because it blocks the final step of acid production

USES: Gastroesophageal reflux disease (GERD), severe erosive esophagitis, poorly responsive systemic GERD, pathologic hypersecretory conditions (Zollinger-Ellison syndrome, systemic mastocytosis, multiple endocrine adenomas); treatment of active duodenal ulcers with/without antiinfectives for *Helicobacter pylori*

Unlabeled uses: NSAID-induced ulcer prophylaxis, stress gastritis prophylaxis

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (C), breastfeeding, children

DOSAGE AND ROUTES

Active duodenal ulcers
- **Adult: PO** 20 mg/day × 4-8 wk; associated with *H. pylori* 40 mg q AM and clarithromycin 500 mg tid on days 1-14 then 20 mg/day on days 15-28

Severe erosive esophagitis/poorly responsive GERD
- **Adult: PO** (del rel cap/del rel susp) 20 mg/day × 4-8 wk

Pathologic hypersecretory conditions
- **Adult: PO** 60 mg/day; may increase to 120 mg tid; daily doses >80 mg should be divided

Gastric ulcer
- **Adult: PO** 40 mg/day 4-8 wk
- **Geriatric: PO** ≤20 mg/day

Heartburn (OTC)
- **Adult: PO** 1 del rel tab (20 mg)/day before AM meal with glass of water

Available forms: Del rel caps 10, 20, 40 mg; del rel tabs 20 mg; granules for oral susp 2.5, 10 mg (del rel)

Administer:
- Swallow caps whole; do not crush or chew; caps may be opened and sprinkled over applesauce
- Before eating, usually in the AM, separate with other medications
- **Oral susp powder:** give on empty stomach ≥1 hr before food; if there is NG or enteral feeding tube, do not feed 2 hr before or 1 hr after giving product; contents of packet should be mixed with 1-2 tbls water, add 20 ml water for NG tube; for oral, stir well, drink, add more water, and drink

SIDE EFFECTS

CNS: *Headache, dizziness, asthenia*

CV: Chest pain, angina, tachycardia, bradycardia, palpitations, peripheral edema, heart failure

EENT: Tinnitus, taste perversion

GI: *Diarrhea, abdominal pain, vomiting, nausea, constipation, flatulence, acid regurgitation,* abdominal swelling, anorexia, irritable colon, esophageal candidiasis, dry mouth, hepatic failure

GU: UTI, urinary frequency, increased creatinine, proteinuria, hematuria, testicular pain, glycosuria
HEMA: Pancytopenia, thrombocytopenia, neutropenia, leukocytosis, anemia
INTEG: *Rash,* dry skin, urticaria, pruritus, alopecia
META: Hypoglycemia, increased hepatic enzymes, weight gain, hypomagnesemia, hyponatremia, vit B12 deficiency
MISC: *Back pain,* fever, fatigue, malaise
RESP: *Upper respiratory infections, cough,* epistaxis, pneumonia
SYST: Angioedema, exfoliative dermatitis, Stevens-Johnson syndrome, toxic epidermal necrolysis

PHARMACOKINETICS

Bioavailabity 30%-40%; peak ½-3½ hr; half-life ½-1 hr; protein binding 95%; eliminated in urine as metabolites and in feces; in geriatric patients, elimination rate decreased, bioavailability increased; metabolized by CYP2C19 enzyme system

INTERACTIONS

Increase: bleeding—warfarin
Increase: serum levels of diazepam, phenytoin, flurazepam, triazolam, cycloSPORINE, disulfiram, digoxin
Decrease: effect of iron salts, ketoconazole, cyanocobalamin, calcium carbonate, ampicillin, indinavir, gefitinib
Drug/Lab Test
Increase: alk phos, AST, ALT, bilirubin, gastrin

NURSING CONSIDERATIONS

Assess:
• **GI system:** bowel sounds q8hr, abdomen for pain, swelling, anorexia, blood in stools
• **Electrolyte imbalances:** hyponatremia; hypomagnesemia in patients using product (3 mo-1 yr); if hypomagnesemia occurs, use of magnesium supplements may be sufficient, if severe, discontinue product
• **Hepatic enzymes:** AST, ALT, alk phos during treatment; **blood studies:** CBC, differential during treatment, blood dyscrasias may occur; vit B12 in long-term treatment
⚠ **Serious skin reactions:** toxic epidermal necrolysis, Stevens-Johnson syndrome, angioedema, exfoliative dermatitis; fever, sore throat, fatigue, thin ulcers, lesions in mouth, lips; discontinue product, some serious skin disorders may be fatal

Evaluate:
• Therapeutic response: absence of epigastric pain, swelling, fullness, bleeding; decreased GERD, esophagitis symptoms

Teach patient/family:
• To report severe diarrhea; black, tarry stools; abdominal cramps/pain; or continuing headache; product may have to be discontinued
• That, if diabetic, hypoglycemia may occur
• To avoid hazardous activities because dizziness may occur
• To avoid alcohol, salicylates, NSAIDs; may cause GI irritation
• To take as directed, even if feeling better; to take missed dose as soon as remembered; not to double; PriLOSEC OTC takes up to 4 days for full effect

O

ondansetron (Rx)

(on-dan-seh'tron)
Zofran, Zofran ODT, Zuplenz
Func. class.: Antiemetic
Chem. class.: 5-HT_3 receptor antagonist

Do not confuse:
Zofran/Zantac

ACTION: Prevents nausea, vomiting by blocking serotonin peripherally, centrally, and in the small intestine

USES: Prevention of nausea, vomiting associated with cancer chemotherapy, radiotherapy; prevention of postoperative nausea, vomiting

Unlabeled uses: Pruritus (rectal use), alcoholism, hyperemesis gravidarum

CONTRAINDICATIONS:

Hypersensitivity; phenylketonuric hypersensitivity (oral disintegrating tab), torsades de pointes

Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, granisetron hypersensitivity, QT prolongation, torsades de pointes

DOSAGE AND ROUTES

Prevention of nausea/vomiting (cancer chemotherapy)

- **Adult and child 4-18 yr: IV** 0.15 mg/kg infused over 15 min given 30 min before start of cancer chemotherapy, max 16 mg/dose; 0.15 mg/kg given 4 hr and 8 hr after 1st dose or 16 mg as single dose; dilute in 50 ml of D_5 or 0.9% NaCl before giving; **RECT** (unlabeled) 16 mg/day 2 hr prior to chemotherapy; **PO** 8 mg ½ hr prior to chemotherapy, repeat 4, 8 hr after 1st dose
- **Child ≥4 yr: PO** 4 mg TID, first dose ½ hr prior to chemotherapy

Prevention of nausea/vomiting (radiotherapy)

- **Adult: PO** 8 mg tid, may repeat q8hr

Prevention of postoperative nausea/vomiting

- **Adult: IV/IM** 4 mg undiluted over >30 sec prior to induction of anesthesia
- **Child 2-12 yr: IV** 0.1 mg/kg (≤40 kg); **IV** 4 mg (≥40 kg), give over ≥30 sec

Hepatic dose

- **Adult: PO/IM/IV** Max dose 8 mg/day

Hyperemesis gravidarum (unlabeled)

- **Adult: PO/IV** 4-8 mg bid-tid

Pruritus (unlabeled)

- **Adult: PO** 8 mg bid

Alcoholism (unlabeled)

- **Adult: PO** 4 mcg/kg bid

Available forms: Inj 2 mg/ml, 32 mg/50 ml (premixed); tabs 4, 8 mg; oral sol 4 mg/5 ml; oral disintegrating tabs 4, 8 mg; oral dissolving film 4, 8 mg

Administer:

PO route

- **Oral disintegrating tab:** do not push through foil; gently remove, immediately place on tongue to dissolve; swallow with saliva
- **Oral dissolving film:** fold pouch along dotted line to expose tear notch; while folded, tear and remove film, place film on tongue until dissolved, swallow after dissolved; to reach desired dose, administer successive films, allowing each to dissolve before using another

IM route

- Visually inspect for particulate or discoloration
- May give 4 mg undiluted IM, inject deeply in large muscle mass, aspirate

Direct IV route

- Check for discoloration or particulate, if particulate is present, shake to dissolve
- After diluting single dose in 50 ml NS or D_5W, 0.45% NaCl or NS; give over 15 min
- Do not use IV 32 mg/dose in chemotherapy nausea/vomiting due to QT prolongation, max 16 mg/dose (adult)

Y-site compatibilities: Aldesleukin, amifostine, amikacin, aztreonam, bleomycin, CARBOplatin, carmustine, ceFAZolin, cefmetazole, cefotaxime, cefOXitin, ceftAZidime, ceftizoxime, cefuroxime, chlorproMAZINE, cimetidine, cisatracurium, CISplatin, cladribine, clindamycin, cyclophosphamide, cytarabine, dacarbazine, DACTINomycin, DAUNOrubicin, dexamethasone, diphenhydrAMINE, DOPamine, DOXOrubicin, DOXOrubicin liposome, doxycycline, droperidol, etoposide, famotidine, filgrastim, floxuridine, fluconazole, fludarabine, gallium, gentamicin, haloperidol, heparin, hydrocortisone, HYDROmorphone, hydrOXYzine, ifosfamide, imipenem-cilastatin, magnesium sulfate, mannitol, mechlorethamine, melphalan, meperidine, mesna, methotrexate, metoclopramide, miconazole, mitoMYcin, mitoXANtrone, morphine, PACLitaxel, pentostatin, piperacillin/tazobactam, potassium chloride,

prochlorperazine, promethazine, ranitidine, remifentanil, streptozocin, teniposide, thiotepa, ticarcillin, ticarcillin-clavulanate, vancomycin, vinBLAStine, vinCRIStine, vinorelbine, zidovudine

SIDE EFFECTS

CNS: *Headache, dizziness, drowsiness, fatigue, EPS*
GI: *Diarrhea, constipation,* abdominal pain, dry mouth
MISC: Rash, bronchospasm (rare), *musculoskeletal pain, wound problems, shivering, fever, hypoxia, urinary retention*

PHARMACOKINETICS

IV: Mean elimination half-life 3.5-4.7 hr, plasma protein binding 70%-76%, extensively metabolized in the liver, excreted 45%-60% in urine

INTERACTIONS

Increase: unconsciousness, hypotension—apomorphine, do not use together
Increase: QT prolongation—other products that prolong QT
Decrease: ondansetron effect—rifampin, carBAMazepine, phenytoin
Drug/Lab Test
Increase: LFTs

NURSING CONSIDERATIONS

Assess:
• Absence of nausea, vomiting during chemotherapy
• Hypersensitivity reaction: rash, bronchospasm (rare)
• **EPS:** shuffling gait, tremors, grimacing, rigidity periodically
• **QT prolongation:** monitoring ECG in those with cardiac disease or receiving other products that increase QT
Perform/provide:
• Storage at room temp for 48 hr after dilution
Evaluate:
• Therapeutic response: absence of nausea, vomiting during cancer chemotherapy
Teach patient/family:
• To report diarrhea, constipation, rash, changes in respirations, or discomfort at insertion site
• Headache requiring analgesic is common

orlistat (Rx, OTC)

(or'lih-stat)
Alli, Xenical
Func. class.: Weight-control agent
Chem. class.: Lipase inhibitor

ACTION: Inhibits the absorption of dietary fats

USES: Obesity management

CONTRAINDICATIONS: Hypersensitivity, chronic malabsorption syndrome, cholestasis
Precautions: Pregnancy (X), children, hypothyroidism, other organic causes of obesity, anorexia nervosa, bulimia, nephrolithiasis, GI disease, diabetes, fat-soluble vitamin deficiency, breastfeeding

DOSAGE AND ROUTES

• **Adult: PO** (Alli) 60 mg, (Xenical) 120 mg tid with each main meal containing fat, max 360 mg/day
Available forms: Caps (Alli) 60 mg, (Xenical) 120 mg
Administer:
• For obesity only if patient on weight-reduction program that includes dietary changes, exercise; patient should be on a diet with 30% of calories from fat; omit dose of orlistat if meal contains no fat

SIDE EFFECTS

CNS: *Insomnia,* depression, anxiety, dizziness, headache, fatigue
GI: *Oily spotting, flatus with discharge, fecal urgency, fatty/oily stool, oily evacuation, fecal incontinence, frequent defecation,* nausea, vomiting, abdominal pain, infectious diarrhea, rectal

pain, tooth disorder, hypovitaminosis, hepatic failure, hepatitis, pancreatitis
GU: UTI, vaginitis, menstrual irregularity
INTEG: Dry skin, rash
MS: Back pain, arthritis, myalgia, tendinitis
RESP: Influenza, URI, LRI, EENT symptoms

PHARMACOKINETICS

Minimal absorption, peak 8 hr, 99% protein binding, excretion in feces, half-life 1-2 hr

INTERACTIONS

Increase: lipid-lowering effect—pravastatin
Increase: effects of warfarin
Decrease: absorption—fat-soluble vitamins (A, D, E, K), cycloSPORINE

NURSING CONSIDERATIONS

Assess:
• **Weight status:** before starting therapy, obtain testing to rule out physiologic reactions for weight, obtain thyroid testing, BMI, glucose; weight weekly; diabetic patients may need reduction in oral hypoglycemics
• For misuse in certain populations (anorexia nervosa, bulimia)
⚠ **Hepatotoxicity/pancreatitis:** jaundice, weakness, abdominal pain (rare)
Evaluate:
• Therapeutic response: decrease in weight
Teach patient/family:
• That 60-mg cap can be obtained OTC; 60 mg tid is highest OTC dose
• That safety and effectiveness beyond 2 yr have not been determined
• To read patient information sheet; to discuss unpleasant GI side effects
• To take multivitamin containing fat-soluble vitamins 2 hr before or after orlistat; that psyllium taken with each dose or at bedtime may decrease GI symptoms
• To avoid hazardous activities until stabilized on medication; to discuss unpleasant side effects
• To notify prescriber if pregnancy is planned or suspected pregnancy (X), if breastfeeding take proper fat-soluble vitamins
⚠ **Hepatotoxicity/pancreatitis:** yellowing of skin, eyes; dark urine; weakness; abdominal pain

oseltamivir (Rx)

(oss-el-tam'ih-veer)
Tamiflu
Func. class.: Antiviral
Chem. class.: Neuramidase inhibitor

ACTION: Inhibits influenza virus neuraminidase with possible alteration of virus particle aggregation and release

USES: Prevention and treatment of influenza type A or B
Unlabeled uses: Avian flu (H5N1), avian influenzae A (H5N1), swine flu (H1N1), encephalitis

CONTRAINDICATIONS: Hypersensitivity
Precautions: Pregnancy (C), neonates, breastfeeding, infants, children, geriatric patients, renal/hepatic/pulmonary/cardiac disease, psychosis, viral infection

DOSAGE AND ROUTES

Treatment of influenza
• **Adult/child >40 kg: PO** 75 mg bid × 5 days, begin treatment within 2 days of onset of symptoms
• **Child 23-40 kg and ≥1 yr: PO** 60 mg bid
• **Child 15-23 kg and ≥1 yr: PO** 45 mg bid
• **Child ≤15 kg and ≥1 yr: PO** 30 mg bid
• **Neonates ≥14 days, infants: PO** 3 mg/kg/dose BID × 5 days
Prevention of influenza
• **Adult/child ≥13 yr: PO** 75 mg/day × ≥10 days; begin treatment within 2 days of contact, max use 6 wk

Renal dose

• **Adult: PO** CCr 10-30 ml/min, 75 mg/day × 5 days (treatment); 75 mg every other day or 30 mg/day (prophylaxis)

H1N1 influenzae A virus (swine flu) (unlabeled)

• **Adult/adolescent/child >40 kg: PO** 75 mg bid × 5 days

• **Adolescent/child 24-40 kg: PO** 60 mg bid × 5 days

• **Child >1 yr and 15-23 kg: PO** 45 mg bid × 5 days

• **Child >1 yr and ≤15 kg: PO** 30 mg bid × 5 days

Available forms: Caps 30, 45, 75 mg; powder for oral susp 6 mg/ml

Administer:

• Within 2 days of symptoms of influenza; continue for 5 days

• At least 4 hr before bedtime to prevent insomnia

• Without regard to food; give with food for GI upset

• Take with full glass of water

• **Oral susp:** 6 mg/ml conc, take care to administer correct dose; loosen powder from side of bottle, add 55 ml, shake well (6 mg/ml), remove child-resistant cap, push bottle adapter into neck of bottle, close tightly with child-resistant cap to ensure sealing, use within 17 days of preparation when refrigerated or within 10 days at room temp, write expiration date on bottle, shake well prior to use, use oral syringe provided but only with markings for 30, 45, 60 mg, confirm that dosing instructions are in same units as syringe provided

SIDE EFFECTS

CNS: *Headache, dizziness,* fatigue, *insomnia,* seizures, delirium, self-injury (children)

ENDO: Hyperglycemia

GI: *Nausea, vomiting,* diarrhea, abdominal pain

INTEG: Toxic epidermal necrolysis, Stevens-Johnson syndrome, erythema multiforme

RESP: Cough

PHARMACOKINETICS

Rapidly absorbed, protein binding 40%-45%, converted to oseltamivir carboxylate (active form), active forms half-life 1-3 hr, metabolite 6-10 hr, excreted in urine (99%), protein binding 3%

INTERACTIONS

• Avoid use with H1N1 virus vaccine, intranasal influenzae vaccine

NURSING CONSIDERATIONS

Assess:

• Bowel pattern before, during treatment

• **Influenza:** fever, fatigue, sore throat, headache, muscle soreness, aches

Perform/provide:

• Storage in tight, dry container

Evaluate:

• Therapeutic response: absence of fever, malaise, cough, dyspnea in infection

Teach patient/family:

• About aspects of product therapy

• To avoid hazardous activities if dizziness occurs

• To take as soon as symptoms appear; to take full course even if feeling better

• To take missed dose as soon as remembered if within 2 hr of next dose

⚠ To stop immediately; to report to prescriber skin rash, delirium, psychosis, hallucinations (child)

• That this product should not be substituted for flu shot

• Will not treat the common cold

• To avoid other products unless approved by prescriber

O

⚠ HIGH ALERT

oxaliplatin (Rx)

(ox-al-i'plat-in)

Eloxatin

Func. class.: Antineoplastic

Chem. class.: 3rd-generation platinum analog

ACTION: Forms crosslinks, thereby inhibiting DNA replication and transcription; not specific to cell cycle

USES: Metastatic carcinoma of the colon or rectum in combination with 5-FU/leucovorin

Unlabeled uses: Relapsed or refractory non-Hodgkin's lymphoma; advanced ovarian cancer; breast, head/neck, testicular, pancreatic, gastric cancer; mesothelioma

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, radiation therapy or chemotherapy within 1 mo, thrombocytopenia, smallpox vaccination

Black Box Warning: Hypersensitivity to this product or other platinum products

Precautions: Children, geriatric patients, pneumococcus vaccination, renal disease

DOSAGE AND ROUTES

Dosage protocols may vary

Colorectal cancer

• **Adult: IV INF** *Day 1:* oxaliplatin 85 mg/m² in 250-500 ml D_5W and leucovorin 200 mg/m² in D_5W, give both over 2 hr at the same time in separate bags using a Y-line, followed by 5-FU 400 mg/m² **IV BOL** over 2-4 min then 5-FU 600 mg/m² **IV INF** in 500 ml D_5W as a 22-hr **CONT INF**; *day 2:* leucovorin 200 mg/m² **IV INF** over 2 hr, then 5-FU 400 mg/m² **IV BOL** over 2-4 min, then 5-FU 600 mg/m² **IV INF** in 500 ml D_5W as a 22-hr **CONT INF**; repeat cycle q2wk

Renal dose

• **Adult: IV** CCr <30 ml/min, reduce starting dose to 65 mg/m²

Advanced ovarian cancer (unlabeled)

• **Adult: IV** 130 mg/m² q3wk as a single agent in those previously treated

Advanced breast cancer (unlabeled)

• **Adult: IV** 130 mg/m² on day 1 plus 5-fluorouracil (1000 mg/m² **CONT IV INF** days 1-4) q3wk

Pancreatic cancer (unlabeled)

• **Adult: IV** 100 mg/m² on day 2, with gemcitabine 1000 mg/m² on day 1, repeat q2wk; 625 mg/m² bid throughout treatment or fluorouracil 200 mg/m²/day throughout treatment

Gastric cancer (unlabeled)

• **Adult: IV** 130 mg/m² over 2 hr on day 1 with epirubic 50 mg/m² and capecitabine

Available forms: Powder for inj 50, 100-mg single-use vials (5 mg/ml); solution for inj 50 mg/10 ml, 100 mg/20 ml, 200 mg/40 ml

Administer:

Intermittent IV INF route

• Premedicate with antiemetics including $5HT_3$ blockers, with or without dexamethasone; prehydration not needed

• Do not reconstitute or dilute with sodium chloride or any chloride-containing sol, do not use aluminum equipment during any preparation or administration, will degrade platinum; do not refrigerate unopened powder or sol; do not freeze; protect from light

• Use cytotoxic handling procedures; prepare in biologic cabinet using gown, gloves, mask; do not allow product to come in contact with skin; use soap and water if contact occurs

• EPINEPHrine, antihistamines, corticosteroids for hypersensitivity reaction

• **Lyophilized powder:** reconstitute vial 50 mg/10 ml or 100 mg/20 ml sterile water for inj or D_5W; after reconstitution, sol may be stored for ≤24 hr in refrigerator; after dilution in 250-500 ml D_5W,

may store ≤24 hr in refrigerator or 6 hr at room temp, infuse over 2 hr

- **Aqueous solution:** dilute in 250-500 ml of D_5W; after dilution, may store ≤24 hr refrigerator, 6 hr at room temp, infuse over 2 hr

Y-site compatibilities: Alfentanil, amifostine, amikacin, aminocaproic acid, amiodarone, amphotericin B colloidal, amphotericin B lipid complex, amphotericin B liposome, ampicillin, ampicillin-sulbactam, anidulafungin, atenolol, atracurium, azithromycin, aztreonam, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, caspofungin, ceFAZolin, cefotaxime, cefoTEtan, cefOXitin, cefTAZidime, ceftizoxime, ceftRIAXone, cefuroxime, chloramphenicol, chlorproMAZINE, cimetidine, ciprofloxacin, cisatracurium, CISplatin, clindamycin, cyclophosphamide, cycloSPORINE, cytarabine, dacarbazine, DACTINomycin, DAPTOmycin, DAUNOrubicin, dexamethasone, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, dolasetron, DOPamine, doxacurium, DOXOrubicin, doxycycline, droperidol, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, ertapenem, erythromycin, esmolol, etoposide, famotidine, fenoldopam, fentaNYL, fluconazole, fludarabine, foscarnet, fosphenytoin, furosemide, gatifloxacin, gemcitabine, gemtuzumab, gentamicin, glycopyrrolate, granisetron, haloperidol, heparin, hydrALAZINE, hydrocortisone, HYDROmorphone, hydrOXYzine, IDArubicin, ifosfamide, imipenem-cilastatin, inamrinone, insulin (regular), irinotecan, isoproterenol, ketorolac, labetalol, leucovorin, levofloxacin, levorphanol, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, meperidine, meropenem, mesna, metaraminol, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, midazolam, milrinone, minocycline, mitoMYcin, mitoXANtrone, mivacurium, morphine, nafcillin, nalbuphine, naloxone, nesiritide, niCARdipine, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, PACLitaxel, palonosetron, pancuronium, PEMEtrexed, pentamidine, pentazocine, phenylephrine, piperacillin, polymyxin B, potassium chloride/phosphates, procainamide, prochlorperazine, promethazine, propranolol, quiNIDine, quinupristin-dalfopristin, ranitidine, rocuronium, sodium acetate/phosphates, succinylcholine, SUFentanil, sulfamethoxazole-trimethoprim, tacrolimus, teniposide, theophylline, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, tobramycin, tolazoline, topotecan, trimethobenzamide, vancomycin, vasopressin, vecuronium, verapamil, vinBLAStine, vinCRIStine, vinorelbine, voriconazole, zidovudine, zoledronic acid

SIDE EFFECTS

CNS: Peripheral neuropathy, fatigue, headache, dizziness, insomnia
CV: Cardiac abnormalities, thromboembolism
EENT: *Decreased visual acuity, tinnitus, hearing loss*
GI: *Severe nausea, vomiting, diarrhea, weight loss,* stomatitis, anorexia, gastroesophageal reflux, constipation, dyspepsia, mucositis, flatulence
GU: Hematuria, dysuria, creatinine
HEMA: Thrombocytopenia, leukopenia, pancytopenia, neutropenia, anemia, hemolytic uremic syndrome
INTEG: *Alopecia,* rash, flushing, extravasation, redness, swelling, pain at inj site
META: Hypokalemia
RESP: Fibrosis, dyspnea, cough, rhinitis, URI, pharyngitis
SYST: Anaphylaxis, angioedema

PHARMACOKINETICS

Metabolized in liver, excreted in urine; after administration, 15% of platinum in systemic circulation, 85% either in tissues or being eliminated in urine; half-life 390 hr; protein binding >90%

INTERACTIONS

Increase: bleeding risk—NSAIDs, alcohol, anticoagulants, platelet inhibitors, thrombolytics, salicylates
Increase: oxaliplatin toxicity—tannins
Increase: myelosuppression—myelosuppressive agents, radiation
Increase: nephrotoxicity—aminoglycosides, loop diuretics
Decrease: antibody response—live virus vaccines

Drug/Lab Test

Increase: ALT, AST, bilirubin, creatinine
Decrease: potassium, neutrophils, WBC, platelets

NURSING CONSIDERATIONS

Assess:

⚠ **Bone marrow depression:** CBC, differential, platelet count each cycle; withhold product if WBC is <4000 or platelet count is <100,000; notify prescriber of results

• Renal/hepatic studies: BUN, creatinine, serum uric acid, urine CCr before, electrolytes during therapy; dose should not be given if BUN >19 mg/dl; creatinine <1.5 mg/dl; I&O ratio; report fall in urine output of <30 ml/hr; LFTs

Black Box Warning: Anaphylaxis: wheezing, tachycardia, facial swelling, fainting; discontinue product, report to prescriber; resuscitation equipment should be nearby

⚠ **Pulmonary fibrosis:** cough, crackles, dyspnea, pulmonary infiltrate; discontinue immediately, death may occur

• Monitor temp; may indicate beginning infection

• Hepatic studies before each cycle (bilirubin, AST, ALT, LDH) as needed or monthly

• **Bleeding:** hematuria, guaiac, bruising or petechiae, mucosa or orifices; obtain prescription for viscous lidocaine (Xylocaine)

• Effects of alopecia on body image; discuss feelings about body changes

• Edema in feet, joint pain, stomach pain, shaking

Perform/provide:

• Comprehensive oral hygiene

• All medications PO if possible; avoid IM inj when platelets <100,000/mm^3

• Increase fluid intake to 2-3 L/day to prevent urate deposits, calculi formation; elimination of product

• Blankets, hat, gloves for cold prevention

Evaluate:

• Therapeutic response: decreased tumor size, spread of malignancy

Teach patient/family:

⚠ To report signs of **infection:** increased temp, sore throat, flulike symptoms

• To report signs of **anemia:** fatigue, headache, faintness, SOB, irritability

• To report **bleeding;** to avoid use of razors, commercial mouthwash

• To avoid aspirin, ibuprofen, NSAIDs, alcohol; may cause GI bleeding

⚠ To report any changes in breathing, coughing

• That hair may be lost during treatment; that a wig or hairpiece may make patient feel better; that new hair may be different in color, texture

• To report numbness, tingling in face or extremities, poor hearing or joint pain or swelling

• Not to receive vaccines during treatment

⚠ To use contraception during treatment and for 4 mo after; that product may cause infertility, pregnancy (D)

• **Dysesthesias:** to avoid contact with cold (air, ice, liquid)

oxazepam (Rx)

(ox-ay'ze-pam)

Func. class.: Sedative/hypnotic; antianxiety

Chem. class.: Benzodiazepine, short acting

Controlled Substance Schedule IV

ACTION: Potentiates the actions of GABA, especially in the limbic system and the reticular formation

USES: Anxiety, alcohol withdrawal, insomnia

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, children <6 yr, hypersensitivity to benzodiazepines, closed-angle glaucoma, psychosis

Precautions: Geriatric patients, debilitated, renal/hepatic disease, depression, suicidal ideation, dementia, sleep apnea, seizure disorder

DOSAGE AND ROUTES

Anxiety

- **Adult: PO** 10-30 mg tid-qid, max 120 mg/day
- **Geriatric: PO** 5 mg daily-bid initially, may increase, max 15 mg qid

Alcohol withdrawal

- **Adult: PO** 15-30 mg tid-qid

Available forms: Caps 10, 15, 30 mg

Administer:

- Without regard to food

SIDE EFFECTS

CNS: *Dizziness, drowsiness,* confusion, headache, anxiety, tremors, fatigue, depression, insomnia, hallucinations, paradoxical excitement, transient amnesia

CV: *Orthostatic hypotension,* ECG changes, tachycardia, hypotension

EENT: *Blurred vision,* tinnitus, mydriasis

GI: Nausea, vomiting, anorexia

HEMA: Leukopenia

INTEG: Rash, dermatitis, itching

SYST: Dependence

PHARMACOKINETICS

Peak 2-4 hr; metabolized by liver; excreted by kidneys; half-life 5-15 hr; crosses placenta, breast milk; protein binding 97%

INTERACTIONS

Increase: oxazepam effects—CNS depressants, alcohol, disulfiram, oral contraceptives

Decrease: oxazepam effects—oral contraceptives, phenytoin, theophylline, valproic acid

Decrease: effects of levodopa

Drug/Herb

Increase: CNS depression—kava, melatonin, valerian

Drug/Lab Test

Increase: AST, ALT, serum bilirubin

Decrease: WBC

NURSING CONSIDERATIONS

Assess:

- B/P (lying, standing), pulse; if systolic B/P drops 20 mm Hg, hold product, notify prescriber

⚠ Mental status: mood, sensorium, affect, sleeping pattern, drowsiness, dizziness, **suicidal thoughts/behaviors**

⚠ **Physical dependency, withdrawal symptoms:** headache, nausea, vomiting, muscle pain, weakness, tremors, seizures (long-term use)

Perform/provide:

- Assistance with ambulation during beginning therapy because drowsiness, dizziness occurs
- Safety measures, including side rails

Evaluate:

- Therapeutic response: decreased anxiety, restlessness, insomnia

Teach patient/family:

- That product may be taken without regard to food
- That medication not to be used for everyday stress or used >4 mo unless di-

rected by prescriber; not to take more than prescribed dose because product may be habit forming
• To avoid OTC preparations (cough, cold, hay fever) unless approved by prescriber
• To avoid driving, activities that require alertness because drowsiness may occur
• To avoid alcohol, other psychotropic products unless directed by prescriber
• Not to discontinue product abruptly after long-term use
• To rise slowly because fainting may occur, especially among geriatric patients
• That drowsiness may worsen at beginning of treatment
• To notify prescriber if pregnancy is planned or suspected pregnancy (D)

OXcarbazepine (Rx)

(ox'kar-baz'uh-peen)

Trileptal

Func. class.: Anticonvulsant

Chem. class.: carBAMazepine analog

ACTION: May inhibit nerve impulses by limiting influx of sodium ions across cell membrane in motor cortex

USES: Partial seizures
Unlabeled uses: Trigeminal neuralgia, atypical panic disorder, bipolar disorder

CONTRAINDICATIONS: Hypersensitivity
Precautions: Pregnancy (C), breastfeeding, children <4 yr, hypersensitivity to carBAMazepine, renal disease, fluid restriction, hyponatremia, abrupt discontinuation, suicidal ideation

DOSAGE AND ROUTES

Seizures, adjunctive therapy
• **Adult: PO** 300 mg bid, may be increased by 600 mg/day in divided doses bid at weekly intervals; maintenance 1200 mg/day
• **Child 4-16 yr: PO** 8-10 mg/kg/day divided bid; dose determined by weight, increase by 5 mg/kg/day q3days, max doses weight dependent

Conversion to monotherapy for partial seizures
• **Adult: PO** 300 mg bid with reduction in other anticonvulsants; increase OXcarbazepine by 600 mg/day each week over 2-4 wk; withdraw other anticonvulsants over 3-6 wk; max 2400 mg/day

Initiation of monotherapy for partial seizures
• **Adult: PO** 300 mg bid, increase by 300 mg/day q3days to 1200 mg in divided doses bid

Renal dose
• **Adult: PO** CCr ≤30 ml/min, 150 mg bid, increase slowly

Bipolar disorder/trigeminal neuralgia (unlabeled)
• **Adult: PO** 300 mg bid, may increase by ≤600 mg/day

Available forms: Film-coated tabs 150, 300, 600 mg; oral susp 300 mg/5 ml

Administer:
PO route
• Without regard to meals
• **Oral susp:** shake well, use calibrated oral syringe provided, use or discard within 7 days of opening

SIDE EFFECTS

CNS: *Headache, dizziness, confusion, fatigue,* feeling abnormal, ataxia, abnormal gait, tremors, anxiety, agitation, worsening of seizures, suicidal thoughts/behaviors
CV: *Hypotension,* chest pain, edema
EENT: *Blurred vision, diplopia, nystagmus,* rhinitis, sinusitis
GI: *Nausea, constipation, diarrhea,* anorexia, vomiting, abdominal pain, gastritis
INTEG: Purpura, rash, acne
SYST: Angioedema, anaphylaxis, Stevens-Johnson syndrome, toxic epidermal necrolysis, drug reaction with eosinophilia and systemic symptoms (DRESS)

PHARMACOKINETICS

PO: Onset unknown; peak 4-6 hr; metabolized by liver to active metabolite; terminal half-life 7-9 hr metabolite; inhibits P450 CYP2C19, induces CYP3A4/5

INTERACTIONS

⚠ Contraindicated: MAOIs, ranolazine, nisoldipine

Increase: CNS depression—alcohol

Decrease: effects—felodipine, oral contraceptive, carBAMazepine

Decrease: OXcarbazepine levels—carBAMazepine, PHENobarbital, phenytoin, valproic acid, verapamil

Drug/Herb

Increase: anticonvulsant effect—ginkgo

Decrease: anticonvulsant effect—ginseng, santonica

Drug/Lab Test

Decrease: sodium

NURSING CONSIDERATIONS

Assess:

- Description of seizures: frequency, duration, aura
- Hyponatremia: headache, nausea, confusion, usually within the first 3 mo of treatment, but may occur ≤1 yr, if this product is being used with other products that decrease sodium, monitor sodium levels
- Electrolyte: sodium; T_4; phenytoin (when given together)
- ⚠ **Serious reactions:** angioedema, anaphylaxis, Stevens-Johnson syndrome
- CNS/mental status: mood, sensorium, affect, behavioral changes, confusion, suicidal thoughts/behaviors; if mental status changes, notify prescriber
- Eye problems: need for ophthalmic exams before, during, after treatment (slit lamp, funduscopy, tonometry)
- **Pregnancy:** lack of seizure control due to MHD, a metabolite of OXcarbazepine, monitor seizure control

Perform/provide:

- Storage at room temp

Evaluate:

- Therapeutic response: decreased seizure activity

Teach patient/family:

- To avoid driving, other activities that require alertness
- To take twice a day at same intervals
- Not to discontinue medication quickly after long-term use, seizures may increase
- To inform prescriber if hypersensitive to carBAMazepine; multisystem hypersensitivity may occur, to report fever, other allergic symptoms
- To avoid use of alcohol while taking product
- To use alternative contraception if using hormonal method, to report if pregnancy is planned or suspected pregnancy (C)
- To report skin rashes immediately, serious skin reactions can occur

TREATMENT OF OVERDOSE:

Activated charcoal; give 0.9% NaCl (hypotensive state), atropine (bradycardia); use benzodiazepines, barbiturates for seizures

O

oxybutynin (Rx)

(ox-i-byoo'ti-nin)

Ditropan ♣, Ditropan XL, Gelnique, Oxytrol ♣, Oxytrol Transdermal, Uromax ♣

Func. class.: Anticholinergic

Chem. class.: Synthetic tertiary amine

Do not confuse:

Ditropan/diazepam

ACTION: Relaxes smooth muscles in urinary tract by inhibiting acetylcholine at postganglionic sites

USES: Antispasmodic for neurogenic bladder, overactive bladder

CONTRAINDICATIONS: Hypersensitivity, GI obstruction, urinary reten-

tion, glaucoma, severe colitis, myasthenia gravis, unstable CV disease

Precautions: Pregnancy (B), breastfeeding, children <12 yr, geriatric patients, suspected glaucoma, cardiac disease, dementia

DOSAGE AND ROUTES

• **Adult: PO** 5 mg bid-tid, max 5 mg qid; **EXT REL** 5-10 mg/day, may increase by 5 mg, max 30 mg/day; **TD** apply 1 patch to abdomen, hip, buttock 2×/wk (q3-4 days); **GEL** apply contents of 1 packet to abdomen, upper arms, shoulders, thighs daily

• **Geriatric: PO** 2.5-5 mg bid-tid, increase by 2.5 mg q several days

• **Child >6 yr: PO** 5 mg bid, max 5 mg tid; **EXT REL** 5 mg/day, max 20 mg/day

• **Child 1-5 yr: PO** 0.2 mg/kg/dose bid-tid

Available forms: Syr 5 mg/5 ml; tabs 5 mg; ext rel tabs 5, 10, 15 mg; TD 3.9 mg/day; top gel 10% (Gelnique)

Administer:

PO route

• Do not crush, break, or chew ext rel tabs

• Without regard to meals

Topical route

• Wash hands; apply to clean, dry, intact skin on abdomen, upper arms/shoulders, thighs; avoid navel, rotate sites

• Squeeze contents into palm of hand or directly on site, rub gently

• Do not bathe, exercise, swim for 1 hr after application

• Allow to dry before putting on clothing

• Do not be near flame, fire, or smoke until gel has dried

• Delivers 100 mg

Transdermal route

• Apply to clean, dry, intact skin on abdomen, hip, buttock; use firm pressure; not affected by showering/bathing; rotate sites

• Delivers 3.9 mg/day

SIDE EFFECTS

CNS: *Anxiety, restlessness, dizziness, somnolence, insomnia, nervousness,* seizures, headache, *drowsiness,* confusion

CV: *Palpitations, sinus tachycardia,* hypertension, peripheral edema, **QT prolongation**

EENT: *Blurred vision, dry eyes,* increased intraocular tension, *dry mouth,* throat

GI: *Nausea, vomiting, anorexia,* abdominal pain, *constipation, dyspepsia,* diarrhea, taste perversion, GERD

GU: Dysuria, impotence, *urinary retention, hesitancy*

MISC: Hyperthermia, anaphylaxis, angioedema

PHARMACOKINETICS

Onset $^1/_2$-1 hr, peak 3-6 hr, duration 6-10 hr; metabolized by liver, excreted in urine; terminal half-life 2-3 hr

INTERACTIONS

• Altered pharmacokinetic parameters: CYP3A4 inhibitors

Increase: CNS depression—benzodiazepines, sedatives, hypnotics, opioids

Increase: levels of atenolol, digoxin, nitrofurantoin

Increase: anticholinergic effects—antihistamines, amantidine, other anticholinergics

Increase or decrease: levels of phenothiazines

Decrease: levels of acetaminophen, haloperidol, levodopa

Decrease: effects of oxybutynin—CYP3A4 inducers

NURSING CONSIDERATIONS

Assess:

• **Urinary patterns:** distention, nocturia, frequency, urgency, incontinence, I&O ratios; cystometry to diagnose dysfunction, urinary tract infections should be treated

Allergic reactions: rash, urticaria; if these occur, product should be discontinued; angioedema

QT prolongation: ECG for QT prolongation, ejection fraction; assess for chest pain, palpitations, dyspnea

• CNS effects: confusion, anxiety; anticholinergic effects in geriatric patients

Evaluate:

• Urinary status: dysuria, frequency, nocturia, incontinence

Teach patient/family:

• To avoid hazardous activities because dizziness, blurred vision may occur

• To avoid OTC medications with alcohol, other CNS depressants

• To avoid hot weather, strenuous activity because product decreases perspiration

• About the correct application of each product form

• **Transdermal:** Change patch 2×/wk, do not use same site within 7 days, dispose of and use container not accessible to pets/children

• To open patch immediately before using

• Do not use during MRI, remove

• **Topical gel:** Rotate sites

• Apply to clean, dry skin on abdomen, upper arm/shoulders/thighs

• Gel is flammable

HIGH ALERT

oxyCODONE (Rx)

(ox-i-koe'done)

ETH-Oxydose, Oxecta, Oxyfast, Oxy-CONTIN, Roxicodone, Supeudol ✤

oxyCODONE/aspirin (Rx)

Endodan, Percodan

oxyCODONE/acetaminophen (Rx)

Endocet, Magnacet, Percocet, Primalev, Roxicet, Tylox, Xolox

oxyCODONE/ibuprofen (Rx)

Func. class.: Opiate analgesic

Chem. class.: Semisynthetic derivative

Controlled Substance Schedule II

Do not confuse:

Percodan/Decadron

Roxicet/Roxanol

Tylox/Xanax/Trimox/Wymox

OxyCODONE/HYDROcodone

OxyCODONE/OxyCONTIN

Roxicodone/roxanol

ACTION: Inhibits ascending pain pathways in CNS, increases pain threshold, alters pain perception

USES: Moderate to severe pain

Unlabeled uses: Postherpetic neuralgic (cont rel)

CONTRAINDICATIONS: Hypersensitivity, addiction (opiate), asthma, ileus

Black Box Warning: Respiratory depression

Precautions: Pregnancy (B), breastfeeding, child <18 yr, addictive person-

ality, increased intracranial pressure, MI (acute), severe heart disease, renal/hepatic disease, bowel impaction

Black Box Warning: Opioid-naive patients, substance abuse, accidental exposure, potential for overdose/poisoning, status asthmaticus

DOSAGE AND ROUTES

• **Adult: PO** 10-30 mg q4hr (5-15 mg q4-6hr for opiate-naive patients) Conc sol is extremely concentrated; do not use interchangeably; **CONT REL** 10 mg q12hr for opiate-naive patients

Available forms: OxyCODONE: cont rel tabs (OxyCONTIN) 10, 15, 20, 30, 40, 80, 160 mg; immediate rel tabs 5, 7.5, 10, 15, 20, 30 mg; immediate rel caps 5 mg; oral sol 5 mg/5 ml, 20 mg/ml; **oxyCODONE with acetaminophen:** tabs 2.5 mg/300 mg, 2.5 mg/325 mg, 5 mg/300 mg, 5 mg/325 mg, 7.5 mg/325 mg, 7.5 mg/500 mg, 10 mg/325 mg, 10 mg/400 mg, 10 mg/650 mg; caps 5 mg/500 mg; oral sol 5 mg/325 mg/5 ml; **oxyCODONE with aspirin:** 4.88/325 mg; **oxyCODONE with ibuprofen:** 5 mg/400 mg

Administer:

• OxyCODONE should be titrated from the initial recommended dosage to the dosage required to relieve pain

• There is no maximum dosage of oxyCODONE; however, careful titration is required until tolerance develops to some of the side effects (drowsiness, respiratory depression)

Oral solid formulations

Immediate-release tablets route

• May be administered with food or milk to minimize GI irritation

• **Oxecta brand tablets:** Swallow whole; do not crush or dissolve; owing to nature of this formulation, do not presoak, lick, or otherwise wet tablet before administering dose; administer 1 tablet at a time; allow patient to swallow each tablet separately with sufficient liquid to ensure prompt and complete transit through the esophagus; do not use this brand for administration via nasogastric, gastric, or other feeding tubes because it can obstruct feeding tubes

Oral solid formulations

Controlled-release tablets route (OxyCONTIN):

• Administer whole; do not crush, chew, or break in half; taking chewed, broken, or crushed controlled-release tablets could lead to the rapid release and absorption of a potentially toxic dose of oxyCODONE

• **OxyCONTIN brand tablets:** Owing to hydro-gelling nature of the 2010 reformulation do not presoak, lick, or otherwise wet tablet before administering dose; administer 1 tablet at a time; allow patient to swallow each tablet separately with sufficient liquid to ensure prompt and complete transit through the esophagus

• **OxyCODONE controlled-release (OxyCONTIN)** 60 mg and 80 mg tablets are for use only in opioid-tolerant patients

• May be administered without food

Oral liquid formulations

Oral concentrate solution route

• **OxyFAST** is a highly concentrated solution (20 mg oxyCODONE/ml), and care should be taken in dispensing and administering this medication; for ease of administration, the solution may be added to 30 ml of a liquid or semisolid food; if the medication is placed in liquid or food, the patient needs to consume it immediately; do not store diluted oxyCODONE for future use

SIDE EFFECTS

CNS: *Drowsiness, dizziness, confusion, headache, sedation, euphoria,* fatigue, abnormal dreams/thoughts, hallucinations

CV: Palpitations, bradycardia, change in B/P

EENT: Tinnitus, blurred vision, miosis, diplopia

GI: *Nausea, vomiting, anorexia, constipation, cramps,* gastritis, dyspepsia, biliary spasms
GU: Increased urinary output, dysuria, urinary retention
INTEG: *Rash,* urticaria, bruising, flushing, diaphoresis, pruritus
RESP: Respiratory depression

PHARMACOKINETICS

PO: Onset 15-30 min, peak 1 hr, duration reg rel 2-6 hr, cont rel 12 hr, metabolized by liver, excreted in urine, crosses placenta, excreted in breast milk, half-life 3-5 hr, protein binding 45%

INTERACTIONS

Increase: effects with other CNS depressants—alcohol, opioids, sedative/hypnotics, antipsychotics, skeletal muscle relaxants
Increase: oxyCODONE level: CYP3A4 inhibitors
Increase: toxicity—cimetidine, MAOIs
Drug/Herb
Increase: sedative effect—kava, St. John's wort, valerian
Drug/Lab Test
Increase: amylase, lipase

NURSING CONSIDERATIONS

Assess:
- **Pain:** intensity, location, type, characteristics; need for pain medication by pain/sedation scoring; physical dependence
- I&O ratio; check for decreasing output; may indicate urinary retention
- **CNS changes:** dizziness, drowsiness, hallucinations, euphoria, LOC, pupil reaction
- **Allergic reactions:** rash, urticaria

Black Box Warning: **Respiratory dysfunction:** respiratory depression, character, rate, rhythm; notify prescriber if respirations are <10/min; B/P, pulse

- **Bowel status:** constipation; stimulant laxative may be needed with fluids, fiber

Black Box Warning: **Substance abuse:** assess for substance abuse in patient/family/friends before prescribing: monitor for abuse

Black Box Warning: **Accidental exposure:** dispose of properly away from pets, children

Perform/provide:
- Storage in light-resistant area at room temp
- Assistance with ambulation
- Safety measures: nightlight, call bell within easy reach

Evaluate:
- Therapeutic response: decrease in pain without dependence

Teach patient/family:
- To report any symptoms of CNS changes, allergic reactions
- That physical dependency may result from extended use
- That withdrawal symptoms may occur after long-term use: nausea, vomiting, cramps, fever, faintness, anorexia
- To avoid CNS depressants, alcohol
- To avoid driving, operating machinery if drowsiness occurs

TREATMENT OF OVERDOSE:

Naloxone (Narcan) 0.2-0.8 mg IV, O_2, IV fluids, vasopressors, caution with patients physically dependent on opioids

oxymetazoline nasal agent
See Appendix B

oxymetazoline ophthalmic
See Appendix B

⚠ HIGH ALERT

oxymorphone (Rx)

(ox-i-mor'fone)

Opana, Opana ER

Func. class.: Opiate analgesic

Chem. class.: Semisynthetic phenanthrene derivative

Controlled Substance Schedule II

Do not confuse:
oxymorphones/oxyCODONE

ACTION: Inhibits ascending pain pathways in CNS, increases pain threshold, alters pain perception

USES: Moderate to severe pain

CONTRAINDICATIONS: Hypersensitivity, addiction (opiate), asthma, hepatic disease, ileus, intrathecal use, surgery

Black Box Warning: Respiratory depression

Precautions: Pregnancy (B) (short-term), breastfeeding, children <18 yr, addictive personality, increased intracranial pressure, MI (acute), severe heart disease, respiratory depression, renal/hepatic disease, bowel impaction

Black Box Warning: Alcoholism, opioid-naive patients, substance abuse

DOSAGE AND ROUTES

• **Adult: IM/SUBCUT** 1-1.5 mg q4-6hr prn; **IV** 0.5 mg q4-6hr prn; *opiate naive* **PO** (immediate release only) 5-20 mg q4-6hr prn; *opiate naive* **PO-ER** 5 mg q12hr in those requiring around-the-clock dosing

Labor analgesia

• **Adult: IM** 0.5-1 mg

Available forms: Inj 1, 1.5 mg/ml; ER tab 5, 10, 20, 40 mg; ER tab, crush resistant 5, 10, 20, 30, 40 mg; tabs 5, 10 mg

Administer:

• 1 hr before or 2 hr after food (PO)
• With antiemetic for nausea, vomiting
• Do not break, crush, chew ER product
• When pain is beginning to return; determine interval by response

CONTROLLED REL

• **Opiate naive:** start with lowest dose, titrate upward 5-10 mg q12hr q3-7days to therapeutic response
• When converting from immediate rel to ext rel, give 1/2 daily dose of ext rel product q12hr

SUBCUT route

• Rotate inj sites
• Do not use if respirations are <12/min

IV route

• Give undiluted over 2-3 min

Syringe compatibilities: Glycopyrrolate, hydrOXYzine, ranitidine

SIDE EFFECTS

CNS: *Drowsiness, dizziness, confusion, headache,* hallucinations, increased intracranial pressure, *sedation,* seizures, *euphoria (geriatric patients)*
CV: Palpitations, bradycardia, change in B/P, hypotension
EENT: Tinnitus, blurred vision, miosis, diplopia
GI: *Nausea, vomiting, anorexia, constipation, cramps*
GU: Dysuria, urinary retention
INTEG: *Rash,* urticaria, bruising, flushing, diaphoresis, pruritus
RESP: Respiratory depression

PHARMACOKINETICS

Metabolized by liver, excreted in urine, crosses placenta, half life: PO: 7-9 hr, ext rel: 9-11 hr
PO: Peak 1 hr (fasting)
SUBCUT/IM: Onset 10-15 min, peak 1 1/2 hr, duration 3-6 hr
IV: Onset 5-10 min, peak 15-30 min, duration 3-6 hr

INTERACTIONS

⚠ **Increase:** effects with other CNS depressants—alcohol, opiates, sedative/hypnotics, antipsychotics, skeletal muscle relaxants

⚠ **Increase:** unpredictable effects/reactions—MAOIs

Drug/Herb

Increase: sedative effect—kava, St. John's wort, valerian

Drug/Lab Test

Increase: amylase

NURSING CONSIDERATIONS

Assess:

• **Pain:** location, intensity, type, other characteristics before and 1 hr after (IM) IV 30 min; need for pain medication, physical dependence, give 25%-50% until pain reduction of 50% on pain rating scale, repeat dose may be given at time of peak if previous dose does not control pain and respiratory depression has not occurred; give short-acting opioids for breakthrough pain if patient receiving controlled rel product

• I&O ratio for decreasing output; may indicate urinary retention

• **Bowel status:** constipation; may need stimulative laxative, increased fluids, fiber

• **CNS changes:** dizziness, drowsiness, hallucinations, euphoria, LOC, pupil reaction

• **Allergic reactions:** rash, urticaria

Black Box Warning: **Respiratory dysfunction:** respiratory depression, character, rate, rhythm; notify prescriber if respirations are <10/min

Black Box Warning: **Accidental exposure:** dispose of properly, away from children/pets

Black Box Warning: **Overdose/poisoning:** avoid alcohol ingestion, do not crush, chew, snort, or inject tabs, high abuse potential

Black Box Warning: **Opioid-naive patients:** ext rel tabs are not to be used immediately postop (12-24 hr after surgery) in these patients

Perform/provide:

• Storage in light-resistant area at room temp

Evaluate:

• Therapeutic response: decrease in pain

Teach patient/family:

• To report any symptoms of CNS changes, allergic reactions

• That physical dependency may result from extended use

• That withdrawal symptoms may occur: nausea, vomiting, cramps, fever, faintness, anorexia

• Not to drive or operate machinery if drowsiness occurs

⚠ Not to use other CNS depressants, alcohol

• To make position changes slowly to prevent orthostatic hypotension

TREATMENT OF OVERDOSE:

Naloxone (Narcan) 0.2-0.8 mg IV, (caution with patients physically dependent on opioids) O_2, IV fluids, vasopressors

O

⚠ *HIGH ALERT*

oxytocin (Rx)

(ox-i-toe'sin)

Pitocin

Func. class.: Hormone

Chem. class.: Oxytocic, uterine-active agent

ACTION: Acts directly on myofibrils, thereby producing uterine contraction; stimulates milk ejection by the breast; vasoactive antidiuretic effect

USES: Stimulation, induction of labor; missed or incomplete abortion; postpartum bleeding

CONTRAINDICATIONS:

Hypersensitivity, serum toxemia, cephalopelvic disproportion, fetal distress, hypertonic uterus, prolapsed umbilical cord, active genital herpes

Precautions: Cervical/uterine surgery, uterine sepsis, primipara >35 yr, 1st/2nd stage of labor

Black Box Warning: Elective induction of labor

DOSAGE AND ROUTES

Postpartum hemorrhage

- **Adult: IV** 10-40 units in 1000 ml nonhydrating diluent infused at 20-40 mU/min
- **Adult: IM** 3-10 units after delivery of placenta

Contraction stress test (CST)

- **Adult: IV** 0.5 mU/min, increase q20min until 3 contractions within 10 min

Stimulation of labor

- **Adult: IV** 1-2 mU/min, increase by 1-2 mU q15-60min until contractions occur then decrease dose

Incomplete abortion

- **Adult: IV INF** 10 units/500 ml D_5W or 0.9% NaCl at 10-20 mU/min, max 30 units/12 hr

Available forms: Inj 10 units/ml

Administer:

IV route

- Use infusion pump

Labor induction

- After diluting 10 units/1000 ml of 0.9% NS or D_5 NS run at 1-2 mU/min at 15- to 30-min intervals to begin normal labor; dilute 10-40 mU/min; titrate to control postpartum bleeding; dilute 10 units/500 ml sol; run 10 units-20 mU/ml; administer by only 1 route at a time; use inf pump; rotate inf to provide mixing; do not shake

Control of postpartum bleeding

- Dilute 10-40 units/1000 ml of sol; run at 10-20 mU/min; adjust rate as needed
- With crash cart available on unit (magnesium sulfate at bedside)

Incomplete, inevitable, elective abortion

- Dilute 10 units/500 ml compatible IV sol

Y-site compatibilities: Heparin, hydrocortisone, insulin (regular), meperidine, morphine, potassium chloride, vit B/C, warfarin

SIDE EFFECTS

CNS: Seizures, tetanic contractions
CV: Hypo/hypertension, dysrhythmias, increased pulse, bradycardia, tachycardia, PVC
FETUS: Dysrhythmias, jaundice, hypoxia, intracranial hemorrhage
GI: Anorexia, nausea, vomiting, constipation
GU: Abruptio placentae, decreased uterine blood flow
HEMA: Increased hyperbilirubinemia
INTEG: Rash
RESP: Asphyxia
SYST: Water intoxication of mother

PHARMACOKINETICS

IM: Onset 3-7 min, duration 1 hr, half-life 12-17 min
IV: Onset 1 min, duration 30 min, half-life 12-17 min

INTERACTIONS

- Hypertension: vasopressors

Drug/Herb

- Hypertension: ephedra

NURSING CONSIDERATIONS

Assess:

- I&O ratio
- B/P, pulse; watch for changes that may indicate hemorrhage
- Respiratory rate, rhythm, depth; notify prescriber of abnormalities
- Length, intensity, duration of contraction; notify prescriber of contractions lasting >1 min or absence of contractions; turn patient on her side; discontinue oxytocin
- FHTs, fetal distress; watch for acceleration, deceleration; notify prescriber if

problems occur; fetal presentation, pelvic dimensions; turn patient on left side if FHT change in rate, give O_2

⚠ **Water intoxication;** confusion, anuria, drowsiness, headache

Evaluate:

• Therapeutic response: stimulation of labor, control of postpartum bleeding

Teach patient/family:

• To report increased blood loss, abdominal cramps, fever, foul-smelling lochia

• That contractions will be similar to menstrual cramps, gradually increasing in intensity

Black Box Warning: Elective induction of labor: use only for induction when medically necessary

PACLitaxel (Rx)

(pa-kli-tax'el)

PACLitaxel nanoparticle albumin-bound (Rx)

Abraxane

Func. class.: Antineoplastic—miscellaneous

Chem. class.: Taxane

Do not confuse:

PACLitaxel/PARoxetine/Paxil

ACTION: Inhibits reorganization of microtubule network needed for interphase and mitotic cellular functions; causes abnormal bundles of microtubules during cell cycle and multiple esters of microtubules during mitosis

USES: Taxol: metastatic carcinoma of the ovary, breast; AIDS-related Kaposi's sarcoma (2nd-line), non–small-cell lung cancer (1st-line), adjuvant treatment for node-positive breast cancer

Unlabeled uses: Advanced head, neck, small-cell lung cancer; non-Hodgkin's lymphoma, adenocarcinoma of the upper GI tract, hormone-refractory prostate cancer, bladder cancer

CONTRAINDICATIONS: Pregnancy (D); hypersensitivity to paclitaxel or other products with polyoxyethylated castor oil, albumin

Black Box Warning: Neutropenia of $<1500/mm^3$

Precautions: Breastfeeding, children, females, geriatric patients, cardiovascular/hepatic/renal disease, CNS disorder, bone marrow suppression, dental disease/work, extravasation, herpes, infection, infertility, jaundice, ocular exposure, radiation therapy, thrombocytopenia, vaccination

Black Box Warning: Taxane hypersensitivity, requires a specialized care setting, requires an experienced clinician

DOSAGE AND ROUTES

PACLitaxel

Ovarian carcinoma

• **Adult: IV INF** 135 mg/m² given over 24 hr q3wk then CISplatin 75 mg/m²; or 175 mg/m² over 3 hr q3wk; or 175 mg/m² over 3 hr

Advanced ovarian carcinoma

• **Adult: IV/INF** 175 mg/m² with CISplatin 75 mg/m² using a 3-hr regimen q3wk

Breast carcinoma

• **Adult: IV INF** 175 mg/m² over 3 hr q3wk × 4 courses

AIDS-related Kaposi's sarcoma

• **Adult: IV INF** 135 mg/m² over 3 hr q3wk or 100 mg/m² over 3 hr q2wk

1st-line non–small-cell lung cancer

• **Adult: IV INF** 135 mg/m²/24 hr inf with CISplatin 75 mg/m² × 3 wk

Hepatic dose

• **Adult:** for 135 mg/m² 24-hr IV INF AST/ALT 2-10 × ULN, total bilirubin ≤1.5 mg/dl: 100 mg/m²; AST/ALT <10 × ULN, total bilirubin 1.6-7.5 mg/dl: 50 mg/m²; AST/ALT ≥10 × ULN or total bilirubin >7.5 mg/dl; avoid use; for 175/m² 3-hr IV INF AST/ALT <10 × ULN, total bilirubin 1.26-2 × ULN: 135 mg/m²; AST/ALT <10 × ULN, total bilirubin 2.01-5 × ULN: 90 mg/m²; AST/ALT ≥10 × ULN or total bilirubin >5 × ULN: avoid use

Bladder cancer (unlabeled)
• **Adult: IV** 175 mg/m² over 3 hr with CARBOplatin

Head/neck cancer (unlabeled)
• **Adult: IV** 250 mg/m² over 24 hr or 175-300 mg/m² over 3 hr

Stem cell transplant/bone marrow ablation (unlabeled)
• **Adult: IV** 250-775 mg/m² over 24 hr in combination with other chemotherapy

PACLitaxel protein-bound particles
• **Adult: IV** 260 mg/m² q3wk

Available forms: Inj 6 mg/ml, 30 mg/5-ml vial, 100 mg/16.7-ml vial, 150 mg/25-ml vial, 300 mg/50-ml vial; powder for inj, lyophilized 100 mg in single-use vials (Abraxane)

Administer:
• CBC, differential, platelet count before treatment and weekly; withhold product if WBC is <1500/mm³ or platelet count is <100,000/mm³; notify prescriber
• If CISplatin is given, use after taxane
• Confirmation that dexamethasone was given 12 hr and 6 hr before inf begins
• Storage of prepared sol up to 27 hr in refrigerator

Continuous IV INF route
• After premedicating with dexamethasone 20 mg PO 12 hr and 6 hr before PACLitaxel, diphenhydrAMINE 50 mg IV ½-1 hr before PACLitaxel and cimetidine 300 mg or ranitidine 50 mg IV ½-1 hr before PACLitaxel
• For extravasation if given by regular IV, not port

PACLitaxel
• After diluting in 0.9% NaCl, D_5, D_5 and 0.9% NaCl, D_5LR (0.3-1.2 mg/ml), chemo dispensing pin or similiar devices with spikes should not be used in vials of Taxol; use in-line filter ≤0.22 micron; may be given as 3-hr or 24-hr inf
• Using only glass bottles, polypropylene, polyolefin bags and administration sets; do not use PVC inf bags or sets

Y-site compatibilities: Acyclovir, amikacin, aminophylline, ampicillin/sulbactam, bleomycin, butorphanol, calcium chloride, CARBOplatin, cefepime, cefoTEtan, cefTAZidime, cefTRIAXone, cimetidine, CISplatin, cladribine, cyclophosphamide, cytarabine, dacarbazine, dexamethasone, diphenhydrAMINE, DOXOrubicin, droperidol, etoposide, famotidine, floxuridine, fluconazole, fluorouracil, furosemide, ganciclovir, gentamicin, granisetron, haloperidol, heparin, hydrocortisone, HYDROmorphone, ifosfamide, LORazepam, magnesium sulfate, mannitol, meperidine, mesna, methotrexate, metoclopramide, morphine, nalbuphine, ondansetron, pentostatin, potassium chloride, prochlorperazine, propofol, ranitidine, sodium bicarbonate, thiotepa, vancomycin, vinBLAStine, vinCRIStine, zidovudine

Abraxane

Intermittent IV INF route
• Reconstitute vial by injecting 20 ml of 0.9% NaCl; slowly inject 20 ml of 0.9% NaCl over at least 1 min to direct sol flow on wall of vial; do not inject 0.9% NaCl directly onto lyophilized cake (foaming will occur); allow vial to sit for at least 5 min to ensure proper wetting of lyophilized cake; gently swirl or invert vial slowly for ≥2 min until completely dissolved
• Calculate dose by dosing vol/ml = total dose (mg) ÷ 5 (mg/ml)

SIDE EFFECTS

CNS: *Peripheral neuropathy*
CV: Bradycardia, *hypotension,* abnormal ECG, supraventricular tachycardia (SVT)
GI: *Nausea, vomiting, diarrhea, mucositis, stomatitis, increased bilirubin, alk phos, AST*
HEMA: Neutropenia, leukopenia, thrombocytopenia, anemia, bleeding, infections
INTEG: *Alopecia,* tissue necrosis, generalized urticaria, *flushing*
MS: *Arthralgia, myalgia*
RESP: Pulmonary embolism, dyspnea
SYST: *Hypersensitivity reactions,* anaphylaxis, Stevens-Johnson syndrome, toxic epidermal necrolysis, angioedema

PHARMACOKINETICS

89%-98% of product serum protein bound, metabolized in liver, excreted in bile and urine; terminal half-life 5.3-17.4 hr

INTERACTIONS

Increase: myelosuppression—other antineoplastics, radiation

Increase: DOXOrubicin levels—DOXOrubicin

Increase: toxicity, decrease metabolism—ketoconazole; avoid concurrent use

Increase: bleeding risk—NSAIDs, anticoagulants

Decrease: paclitaxel metabolism—verapamil, diazepam, cycloSPORINE, teniposide, etoposide, quiNIDine, dexamethasone, vinCRIStine, testosterone

Decrease: paclitaxel levels—CYP2C8, CYP2C9 inducers

Decrease: immune response—live virus vaccines

Drug/Lab Test

Increase: AST/ALT

Decrease: neutrophils, platelets, WBC, Hgb

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Requires a specialized care setting such as a hospital or facility with management of complications; should be used by a clinician experienced in cytotoxic agents

- **Cardiovascular status:** ECG continuously in CV conditions; monitor for hypotension, sinus bradycardia/tachycardia
- **Peripheral neuropathy:** paresthesias, numbness; during inf, use ice packs on extremities to lessen continued neuropathy; may use acupuncture for some relief, use of ice on extremities when infusing
- **Arthralgia, myalgia:** may begin 2-3 days after inf and continue for 4-5 days; may use analgesics
- **Nausea, vomiting:** premedicate with antiemetics; nausea and vomiting occur often
- Hepatic studies before, during therapy (bilirubin, AST, ALT, LDH) prn or monthly, check for jaundiced skin and sclera, dark urine, clay-colored stool, itchy skin, abdominal pain, fever, diarrhea
- VS during 1st hr of inf, check IV site for signs of infiltration
- **Hypersensitivity reactions, anaphylaxis:** hypotension, dyspnea, angioedema, generalized urticaria; discontinue inf immediately; keep emergency equipment available, monitor continuously during first 30-60 min then periodically
- **Flush:** for mild to moderate flush, may continue diphenhydrAMINE for ≤48 hr
- Effects of alopecia on body image; discuss feelings about body changes

Evaluate:

- Therapeutic response: decreased tumor size, spread of malignancy

Teach patient/family:

- To report signs of infection: fever, sore throat, flulike symptoms
- To report signs of anemia: fatigue, headache, faintness, SOB, irritability
- To report bleeding; to avoid use of razors, commercial mouthwash; to use soft-bristle toothbrush; to use viscous xylocaine or compounded formula for stomatitis
- To avoid use of aspirin, ibuprofen
- To avoid crowds, persons with known infections
- That hair may be lost during treatment; that a wig or hairpiece may make patient feel better; that new hair may be different in color, texture
- That pain in muscles and joints 2-5 days after inf is common
- To notify prescriber if pregnancy is planned or suspected, pregnancy (D), do not breastfeed
- To avoid receiving vaccinations while taking product

paliperidone (Rx)

(pal-ee-per'i-done)

Invega, Invega Sustenna

Func. class.: Antipsychotic

Chem. class.: Benzisoxazole derivative

Do not confuse:
Invega/Iveegam
paliperidone/risperiDONE

ACTION: Mediated through both DOPamine type 2 (D_2) and serotonin type 2 ($5\text{-}HT_2$) antagonism

USES: Schizophrenia

CONTRAINDICATIONS: Breastfeeding, geriatric patients, seizure disorders, AV block, QT prolongation, torsades de pointes; hypersensitivity to this product, risperidone

Precautions: Pregnancy (C), children, renal/hepatic disease, obesity, Parkinson's disease

Black Box Warning: Dementia-related psychosis (mortality)

DOSAGE AND ROUTES

• **Adult: PO** 6 mg/day, max 12 mg/day; **IM** 234 mg on day 1 then 156 mg 1 wk later; after 2nd dose, give 117 mg each mo; range 39-234 mg, dosage change may be needed when used with CYP3A4 inducers

• **Child/adolescent ≥12 yr and ≥51 kg: PO** 3 mg daily, may increase if needed by 3 mg/day in intervals of >5 days, up to max 12 mg/day; <51 kg max 6 mg/day

Renal dose

• **Adult: PO** CCr 50-79 ml/min, 3 mg/day, max 6 mg/day; **EXT REL IM** 156 mg on day 1, 117 mg 1 wk later, then 78 mg each mo; CCr 10-49 ml/min, 1.5 mg/day, max 3 mg/day

Available forms: Ext rel tabs 1.5, 3, 6, 9 mg; ext rel susp for inj 39 mg/0.25 ml, 78 mg/0.5 ml, 117 mg/0.75 ml, 156 mg/ml, 234 mg/1.5 ml

Administer:

• Avoid use with CNS depressants

PO route

• Do not break, crush, or chew ext re tabs

• Without regard for food

• Reduced dose for geriatric patients

IM route

• Use for IM only, do not use IV or subcut; inj kits contain prefilled syringe and 2 safety needles, for single use only shake for 10 sec; **deltoid inj:** ≥90 kg use 1.5-inch, 22G needle, <90 kg, use 1-inch, 23G needle, alternate injections between deltoid muscles; **gluteal inj** use 1.5-inch, 22G needle; while holding syringe upright, twist rubber tip clockwise to remove, peel safety needle pouch halfway open, grasp needle sheath using plastic peel pouch, attach needle to Luer connection in clockwise motion, pull needle sheath away using straight pull bring syringe with attached needle upright to de-aerate, de-aerate, inject; after inj, use finger, thumb, or flat surface to activate needle protection system until click heard, use deltoid × 2 doses

SIDE EFFECTS

CNS: *EPS, pseudoparkinsonism, akathisia, dystonia, tardive dyskinesia, drowsiness, insomnia, agitation, anxiety, headache,* seizures, neuroleptic malignant syndrome, dizziness

CV: Orthostatic hypotension, tachycardia; heart failure, QT prolongation, heart block, dysrhythmias

EENT: Blurred vision

ENDO: Hyperinsulinemia, weight gain, hyperglycemia, dyslipidemia

GI: *Nausea,* vomiting, *anorexia, constipation,* weight gain in adolescents, xerostomia

GU: Priapism

HEMA: Agranulocytosis

PHARMACOKINETICS

Peak 24 hr; elimination half-life 23 hr; excreted 80% urine, 11% feces, protein binding >47%

INTERACTIONS

Increase: sedation—other CNS depressants, alcohol, sedative/hypnotics, opiates

Increase: EPS—other antipsychotics

⚠ Increase: QT prolongation—class IA, III antidysrhythmics, azole antifungals, tricyclics (high doses), some phenothiazines, β-blockers, chloroquine, pimozide, droperidol, some antipsychotics, abarelix, alfuzosin, amoxapine, apomorphine, dasatinib, dolasetron, flecainide, halogenated anesthetics

Increase: neurotoxicity—lithium

Increase: serotonin syndrome, neuroleptic malignant syndrome—SSRIs, SNRIs

Decrease: effect of paliperidone—carBAMazepine, other CYP3A4 inducers

Decrease: levodopa effect—levodopa

Drug/Lab Test

Increase: prolactin levels

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Mental status: mood, behavior, confusion, orientation, suicidal thoughts/behaviors; dementia, especially in geriatric patients before initial administration

⚠ QT prolongation: ECG for QT prolongation, ejection fraction; chest pain, palpitations, dyspnea

• Swallowing of PO medication; check for hoarding, giving of medication to others

• Affect, orientation, LOC, reflexes, gait, coordination, sleep pattern disturbances

• B/P (standing, lying), pulse, respirations; q4hr during initial treatment; establish baseline before starting treatment; report drops of 30 mm Hg; watch for ECG changes

• **Hyperprolactinemia:** sexual dysfunction, decreased menstruation, breast pain

• Dizziness, faintness, palpitations, tachycardia on rising

• **EPS:** akathisia, tardive dyskinesia (bizarre movements of jaw, mouth, tongue, extremities), pseudoparkinsonism (rigidity, tremors, pill rolling, shuffling gait)

⚠ Serotonin syndrome, neuroleptic malignant syndrome: hyperthermia, increased CPK, altered mental status, muscle rigidity, fever, seizures, discontinue

• Constipation, urinary retention daily; if these occur, increase bulk and water in diet; monitor for weight gain, especially among adolescents

Perform/provide:

• Supervised ambulation until patient is stabilized on medication; do not involve patient in strenuous exercise program because fainting is possible; patient should not stand still for a long time

• Increased fluids to prevent constipation

• Sips of water, candy, gum for dry mouth

• Storage in tight, light-resistant container

Evaluate:

• Therapeutic response: decrease in emotional excitement, hallucinations, delusions, paranoia; reorganization of patterns of thought, speech

Teach patient/family:

• That orthostatic hypotension may occur; to rise gradually from sitting or lying position

• To avoid hot tubs, hot showers, tub baths because hypotension may occur

• To avoid abrupt withdrawal of this product because EPS may result; that product should be withdrawn slowly

• To avoid OTC preparations (cough, hay fever, cold) unless approved by prescriber because serious product interactions may occur; to avoid alcohol because increased drowsiness may occur

• To avoid hazardous activities if drowsy or dizzy

• About compliance with product regimen; that nonabsorbable tab shell is expelled in stool

• To report impaired vision, tremors, muscle twitching

• That heat stroke may occur in hot weather; to take extra precautions to stay cool

P

• To use contraception; to inform prescriber if pregnancy is planned or suspected, do not breastfeed

Black Box Warning: To notify prescriber of suicidal thoughts/behaviors, other changes in behavior

TREATMENT OF OVERDOSE:

Lavage if orally ingested; provide airway; *do not induce vomiting*

palonosetron (Rx)

(pa-lone-o'se-tron)

Aloxi

Func. class.: Antiemetic

Chem. class.: 5-HT_3 receptor antagonist

ACTION:

Prevents nausea, vomiting by blocking serotonin peripherally, centrally, and in the small intestine at the 5-HT_3 receptor

USES:

Prevention of nausea, vomiting associated with cancer chemotherapy, postoperative nausea/vomiting

CONTRAINDICATIONS:

Hypersensitivity

Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, hypokalemia, hypomagnesium, patients taking diuretics

DOSAGE AND ROUTES

• **Adult: PO** 0.5 mg as single dose 1 hr prior to chemotherapy; **IV** 0.25 mg as single dose over 30 sec ½ hr prior to chemotherapy, max 25 mg **IV** over q7days

Postoperative nausea/vomiting prophylaxis for ≤24 hr after surgery

• **Adult: IV** 0.075 mg given over 10 sec immediately before induction

Available forms: Inj 0.25/5 ml; caps 0.5 mg

Administer:

PO route

• Give 1 hr prior to chemotherapy
• May be taken without regard to food
• Storage at room temp
• Do not mix with other products; flush IV line before and after administration with 0.9% NaCl

Direct IV route

• **Chemotherapy nausea/vomiting:** give as single dose over 30 sec
• **Postoperative nausea/vomiting:** give over 10 sec immediately prior to anesthesia induction

Syringe compatibilities: Dexamethasone

Y-site compatibilities: Alemtuzumab, alfentanil, amifostine, amikacin, aminocaproic acid, aminophylline, amiodarone, amphotericin B liposome, ampicillin, ampicillin/sulbactam, atracurium, atropine, azithromycin, aztreonam, bivalirudin, bleomycin, bumetanide, buprenorphine, busulfan, butorphanol, calcium acetate/chloride/gluconate, CARBOplatin, carmustine, caspofungin, ceFAZolin, cefepime, cefotaxime, cefoTEtan, cefOXitin, cefTAZidime, ceftizoxime, cefTRIAXone, cefuroxime, chloramphenicol, chlorproMAZINE, cimetidine, ciprofloxacin, cisatracurium, CISplatin, clindamycin, cyclophosphamide, cycloSPORINE, cytarabine, dacarbazine, DACTINomycin, dantrolene, DAPTOmycin, DAUNOrubicin, dexamethasone, dexmedetomidine, dexrazoxane, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, doxacurium, DOXOrubicin hydrochloride, droperidol, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, eptifibatide, erythromycin, esmolol, etoposide, etoposide phosphate, famotidine, fenoldopam, fentaNYL, fluconazole, fludarabine, fluorouracil, foscarnet, fosphenytoin, furosemide, gemcitabine, gentamicin, glycopyrrolate, haloperidol, heparin, hydrALAZINE, hydrocortisone, HYDROmorphone, IDArubicin, ifosfamide, inamrinone, insulin, irinotecan, isoproterenol, ketorolac, labetalol, leucovorin, levofloxacin, lidocaine, line-

zolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, melphalan, meperidine, meropenem, mesna, metaraminol, methotrexate, methyldopate, metoclopramide, metoprolol, metroNIDAZOLE, midazolam, milrinone, mitoMYcin, mitoXANtrone, mivacurium, morphine, nalbuphine, naloxone, neostigmine, nesiritide, niCARdipine, nitroglycerin, nitroprusside, norepinephrine, octreotide, oxaliplatin, oxytocin, PACLitaxel, pamidronate, pancuronium, pentazocine, PHENobarbital, phentolamine, phenylephrine, piperacillin/tazobactam, potassium acetate/chloride/phosphates, procainamide, prochlorperazine, promethazine, propranolol, quinupristin/dalfopristin, ranitidine, remifentanil, rocuronium, sodium acetate/bicarbonate/phosphates, streptozocin, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiotepa, ticarcillin/clavulanate, tigecycline, tirofiban, tobramycin, topotecan, trimethobenzamide, trimethoprim/sulfamethoxazole, vancomycin, vasopressin, vecuronium, verapamil, vinBLAStine, vinCRIStine, vinorelbine, zidovudine

SIDE EFFECTS

CNS: *Headache, dizziness, drowsiness, fatigue, insomnia*
GI: *Diarrhea, constipation,* abdominal pain
MISC: Weakness, hyperkalemia, anxiety, rash, bronchospasm (rare), arthralgia, *fever, urinary retention*

PHARMACOKINETICS

62% protein bound; metabolized by liver; unchanged product and metabolites excreted by kidney; terminal elimination half-life 40 hr

INTERACTIONS

• Possible QT prolongation: class 1A antidysrhythmics (disopyramide, procainamide, quiNIDine), class III antidysrhythmics (amiodarone, dofetilide, ibutilide, sotalol), chloroquine, clarithromycin, droperidol, erythromycin, haloperidol, levomethadyl, methadone, pentamidine, some phenothiazines, diuretics (except potassium sparing)

NURSING CONSIDERATIONS

Assess:
• For agents that cause QT prolongation, even if manufacturer has removed QT prolongation from warnings
• Absence of nausea, vomiting during chemotherapy
• **Hypersensitivity reaction:** rash, bronchospasm (rare)
• Cardiac disease: check ECG before use
• Hyperkalemia: monitor potassium
Evaluate:
• Therapeutic response: absence of nausea, vomiting during cancer chemotherapy, postoperatively
Teach patient/family:
• To report diarrhea, constipation, rash, changes in respirations, or discomfort at insertion site
• To avoid alcohol, barbiturates
• Use other antiemetics if nausea occurs

pamidronate (Rx)

(pam-i-drone'ate)

Aredia

Func. class.: Bone-resorption inhibitor, electrolyte modifier
Chem. class.: Bisphosphonate

Do not confuse:
Aredia/Adriamycin

ACTION: Inhibits bone resorption, apparently without inhibiting bone formation and mineralization; adsorbs calcium phosphate crystals in bone and may directly block the dissolution of hydroxyapatite crystals of bone

USES: Moderate to severe Paget's disease, hypercalcemia, osteolytic bone metastases in breast cancer, patients with multiple myeloma

Unlabeled uses: Postmenopausal osteoporosis and prevention, osteoporosis prophylaxis, ankylosing spondylitis, osteogenesis imperfecta, hyperparathyroidism

CONTRAINDICATIONS:

Pregnancy (D), hypersensitivity to bisphosphonates

Precautions: Children, nursing mothers, renal dysfunction, poor dentition

DOSAGE AND ROUTES

Hypercalcemia of malignancy

• **Adult: IV INF** 60-90 mg as single dose for moderate hypercalcemia, 90 mg for severe hypercalcemia over 2-24 hr; dose should be diluted in 1000 ml 0.45% NaCl, 0.9% NaCl, or D_5W; wait 7 days before 2nd course

Osteolytic lesions

• **Adult: IV** 90 mg/500 ml of D_5W, 0.45% NaCl, or 0.9% NaCl given over 4 hr each mo (multiple myeloma) or over 2 hr q3-4wk (breast carcinoma)

Paget's disease

• **Adult: IV INF** 30 mg/day given over 4 hr × 3 days

Severe osteogenesis imperfecta (unlabeled)

• **Child: IV** 1.5-3 mg/kg/cycle, cycle dose is divided in 3, administered via slow IV over 4 hr/day × 3 days

Hypercalcemia (hyperparathyroidism) (unlabeled)

• **Adult: IV** 15-60 mg as a single dose

Corticosteroid-induced osteoporosis (unlabeled)

• **Adult: IV** 30 mg q3mo × 1 yr

Ankylosing spondylitis (unlabeled)

• **Adult: IV INF** 60 mg over 4 hr; 6-hr inf for 1st dose

Osteoporosis prophylaxis in Crohn's disease (unlabeled)

• **Adult: IV INF** 30 mg over 1 hr q3mo × 1 yr

Available forms: Powder for inj 30, 90 mg/vial; inj 3, 6, 9 mg/ml

Administer:

IV route

• After reconstituting by adding 10 ml sterile water for inj to each vial (30 mg/10 ml or 90 mg/10 ml, depending on vial used); add to 1000 ml of sterile 0.45%, 0.9% NaCl, D_5W, run over 2-24 hr **(hypercalcemia)**; dilute reconstituted sol in 500 ml of 0.9% NaCl, 0.45% NaCl, or D_5W, give over 4 hr **(multiple myeloma, Paget's disease)**; dilute reconstituted sol in 250 ml of 0.9% NaCl, 0.45% NaCl, or D_5W, give over 2 hr **(osteolytic bone metastases of breast cancer)**

• Do not mix with calcium-containing inf sol such as Ringer's sol

• Storage of inf sol up to 24 hr at room temp

• Reconstituted sol with sterile water may be refrigerated for ≤24 hr

Y-site compatibilities: Acyclovir, alfentanil, allopurinol, amifostine, amikacin, aminocaproic acid, aminophylline, amphotericin B lipid complex, amphotericin B liposome, ampicillin, anidulafungin, atenolol, atracurium, azithromycin, aztreonam, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, CARBOplatin, carmustine, ceFAZolin, cefepime, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, ceftAZidime, ceftizoxime, ceftRIAXone, cefuroxime, chloramphenicol, chlorproMAZINE, cimetidine, ciprofloxacin, cisatracurium, CISplatin, clindamycin, cyclophosphamide, cycloSPORINE, cytarabine, dacarbazine, DAPTOmycin, dexamethasone, dexmedetomidine, dexrazoxane, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, dolasetron, DOPamine, doxacurium, DOXOrubicin, doxycycline, droperidol, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, ertapenem, erythromycin, esmolol, etoposide, famotidine, fenoldopam, fentaNYL, fluconazole, fludarabine, fluorouracil, foscarnet, fosphenytoin, furosemide, gallium, ganciclovir, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron,

haloperidol, heparin, hetastarch 6%, hydrALAZINE, hydrocortisone, HYDROmorphone, hydrOXYzine, ifosfamide, imipenem-cilastatin, inamrinone, insulin (regular), isoproterenol, ketorolac, labetalol, levofloxacin, levorphanol, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, melphalan, meperidine, meropenem, mesna, metaraminol, methotrexate, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, midazolam, milrinone, minocycline, mitoXANtrone, mivacurium, morphine, mycophenolate, nafcillin, nalbuphine, naloxone, nesiritide, niCARdipine, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxytocin, PACLitaxel, palonosetron, pancuronium, PEMEtrexed, pentamidine, pentazocine, PENTobarbital, PHENobarbital, phenylephrine, piperacillin, polymyxin B, potassium chloride/phosphates, procainamide, prochlorperazine, promethazine, propranolol, quiNIDine, quinupristin-dalfopristin, ranitidine, remifentanil, rocuronium, sodium acetate/bicarbonate/phosphates, succinylcholine, SUFentanil, sulfamethoxazole-trimethoprim, teniposide, theophylline, thiopental, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, tobramycin, tolazoline, topotecan, trimethobenzamide, vancomycin, vasopressin, vecuronium, verapamil, vinBLAStine, vinCRIStine, vinorelbine, voriconazole, zidovudine

SIDE EFFECTS

CNS: *Fever,* fatigue
CV: Hypertension, atrial fibrillation
EENT: Ocular pain, inflammation, vision impairment
GI: Abdominal pain, anorexia, constipation, nausea, vomiting, dyspepsia
GU: Renal failure
HEMA: Thrombocytopenia, anemia, leukopenia
INTEG: Redness, swelling, induration, pain on palpation at site of catheter insertion
META: *Hypokalemia, hypomagnesemia, hypophosphatemia, hypocalcemia,* hypothyroidism
MS: Severe bone pain, myalgia, osteonecrosis of the jaw
RESP: Coughing, dyspnea, upper respiratory tract infection
SYST: Angioedema, anaphylaxis

PHARMACOKINETICS

Rapidly cleared from circulation and taken up mainly by bones, primarily in areas of high bone turnover; eliminated primarily by kidneys; half-life 21-35 hr, terminal half-life in bone is 300 days

INTERACTIONS

Increase: hypokalemia—loop diuretics
Increase: nephrotoxicity—aminoglycosides, NSAIDs, vancomycin, radiopaque contrast agents, cycloSPORINE, tacrolimus
Increase: effect of entecavir
Decrease: pamidronate effect—calcium, vit D
Drug/Lab Test
Increase: creatinine
Decrease: potassium, magnesium, phosphate, calcium, WBC, platelets

NURSING CONSIDERATIONS

Assess:
• **Hypocalcemia:** nausea, vomiting, constipation, thirst, dysrhythmias, hypocalcemia, paresthesia, twitching, laryngospasm, Chvostek's sign, Trousseau's sign; **hypercalcemia:** thirst, nausea, vomiting, dysrhythmias
• Dehydration/hypovolemia: should be corrected during treatment of hypercalcemia, before therapy, maintain adequate urine output
• Monitor WBCs, platelets, electrolytes, creatinine, BUN, Hgb/Hct before beginning treatment
• **Dental health:** cover with antiinfectives for dental extractions

• Temperature may be elevated during the first 3 days after a dose, risk of fever increases as dose increases
• Renal disease: Max 90-mg single dose, longer infusions >2 hr may increase risk for renal toxicity
• Bone pain; use analgesics
• I&O, check for fluid overload edema, crackles, increased B/P; BUN, creatinine

Evaluate:
• Therapeutic response: decreased calcium levels

Teach patient/family
• To notify prescriber if pregnancy is planned or suspected, pregnancy (D)
• To report hypercalcemic relapse: nausea, vomiting, bone pain, thirst; unusual muscle twitching, muscle spasms; severe diarrhea, constipation
• To continue with dietary recommendations, including calcium and vit D
• To obtain analgesic from provider for bone pain
• That, if nausea, vomiting occur, small, frequent meals may help
• To report ocular symptoms to prescriber: blurred vision, edema, inflammation

pancrelipase (Rx)

(pan-kre-li'pase)

Creon, DMH ♣, Pancrease ♣, Pancreaze, Pancrecarb MS, Pertzye, Ultrase MT, Ultresa, Viokase, Zenpep

Func. class.: Digestant

Chem. class.: Pancreatic enzyme—bovine/porcine

ACTION: Pancreatic enzyme needed for the breakdown of substances released from the pancreas

USES: Exocrine pancreatic secretion insufficiency, cystic fibrosis (digestive aid), steatorrhea, pancreatic enzyme deficiency

CONTRAINDICATIONS: Allergy to pork

Precautions: Pregnancy (B), ileus, pancreatitis, Crohn's disease

DOSAGE AND ROUTES

Many products listed above are not interchangeable

• **Adult/adolescent/child ≥4 yr (del rel caps: Creon Caps, Zenpap Caps, Pancreaze Caps): PO** 500 lipase units/kg/meal, titrate based on patient response, max 2500 lipase units/kg/meal
• **Child 1-4 yr: PO** 1000 lipase units/kg/meal, titrate based on patient response, max 2500 lipase units/kg/meal

Available forms: Tabs (Viokase) 10, 204; cap, del rel 4, 8, 154 (Pancrecarb MS), 12, 18, 20 (Ultrase MT), Ultrase; cap 3000, 4200, 5000, 6000, 8000, 10,500, 12,000, 15,000, 16,000, 16,800, 24,000, 25,000 units

Administer:
• After antacid or cimetidine; decreased pH inactivates product
• Low-fat diet for GI symptoms
• Have patient sit up during administration; give with meals
• Do not crush, chew del rel products, caps
• Viokase is not interchangeable with other products

SIDE EFFECTS

GI: Anorexia, nausea, vomiting, diarrhea, cramping, bloating
GU: Hyperuricuria, hyperuricemia

INTERACTIONS

Decrease: absorption—cimetidine, antacids, oral iron
Decrease: effect of acarbose, miglitol

NURSING CONSIDERATIONS

Assess:
• Appropriate height, weight development before and periodically; may be delayed
• I&O ratio; watch for increasing urinary output

• Fecal fat, nitrogen, PT during treatment
• **Diabetes mellitus:** for polyuria, polydipsia, polyphagia
• Pork sensitivity; cross-sensitivity may occur

Perform/provide:
• Adequate hydration
• Storage in tight container at room temp

Evaluate:
• Therapeutic response: improved digestion of carbohydrates, protein, fat; absence of steatorrhea

Teach patient/family:
• To notify prescriber of allergic reactions, abdominal pain, cramping, or blood in urine
• To always take with food, not to crush, chew del rel product, caps
• To store at room temperature, away from moisture

⚠ HIGH ALERT

pancuronium (Rx)

(pan-kyoo-roe'nee-um)
Func. class.: Neuromuscular blocker (nondepolarizing)
Chem. class.: Synthetic curariform

ACTION: Inhibits transmission of nerve impulses by binding with cholinergic receptor sites, antagonizing action of acetylcholine

USES: Facilitation of endotracheal intubation, skeletal muscle relaxation during mechanical ventilation, surgery, or general anesthesia

CONTRAINDICATIONS: Hypersensitivity to bromide ion
Precautions: Pregnancy (C), breastfeeding, children <2 yr, neuromuscular/cardiac/renal/hepatic disease, electrolyte imbalances, dehydration, previous anaphylactic reactions (other neuromuscular blockers)

Black Box Warning: Respiratory insufficiency

DOSAGE AND ROUTES

• **Adult/child/infant >1 mo: IV** 0.04-0.1 mg/kg initially or 0.05 mg/kg after initial dose of succinylcholine; maintenance 0.01 mg/kg 60-100 min after initial dose then 0.01 mg/kg q25-60min as needed; for obese patients, use ideal body weight
• **Neonate <1 mo: IV** Test dose 0.02 mg/kg then 0.03 mg/kg/dose initially, repeat 2× as needed at 5-10 min intervals; maintenance 0.03-0.09 mg/kg/dose q30min-4 hr as needed

Available forms: Inj 1, 2 mg/ml

Administer:

Direct IV route
• May be given undiluted over 1-2 min (1 mg/ml [10-ml vial], 2 mg/ml [2-, 5-ml vial])

Intermittent IV INF route
• Add 100 mg of product to 250 ml D_5W, NS, LR (0.4 mg/ml)

Additive compatibilities: Verapamil, ciprofloxacin

Y-site compatibilities: Aminophylline, ceFAZolin, cefuroxime, cimetidine, DOBUTamine, DOPamine, EPINEPHrine, esmolol, fenoldopam, fentaNYL, fluconazole, gentamicin, heparin, hydrocortisone, isoproterenol, levofloxacin, LORazepam, midazolam, morphine, nitroglycerin, ranitidine, trimethoprim-sulfamethoxazole, vancomycin

SIDE EFFECTS

CV: Bradycardia; tachycardia; increased, decreased B/P; ventricular extrasystoles, edema, hypertension
EENT: Increased secretions
INTEG: Rash, flushing, pruritus, urticaria, sweating, salivation
MS: Weakness to prolonged skeletal muscle relaxation
RESP: Prolonged apnea, bronchospasm, cyanosis, respiratory depression, dyspnea
SYST: Anaphylaxis

P

PHARMACOKINETICS

IV: Onset 3-5 min, dose dependent, peak 3-5 min; metabolized (small amounts), excreted in urine (unchanged), crosses placenta

INTERACTIONS

• Dysrhythmias: theophylline

Increase: neuromuscular blockade—aminoglycosides, clindamycin, enflurane, isoflurane, lincomycin, lithium, local anesthetics, opioid analgesics, polymyxin antiinfectives, quiNIDine, thiazides

Drug/Lab Test

Decrease: cholinesterase

NURSING CONSIDERATIONS

Assess:

• **Respiratory recovery:** decreased paralysis of face, diaphragm, leg, arm, rest of body; allow to recover fully before neurologic assessment

• Electrolyte imbalances (K, Mg); may lead to increased action of product

• VS (B/P, pulse, respirations, airway) until fully recovered; rate, depth, pattern of respirations, strength of hand grip

• I&O ratio; check for urinary retention, frequency, hesitancy

⚠ **Allergic reactions, anaphylaxis:** rash, fever, respiratory distress, pruritus; product should be discontinued

Perform/provide:

• Storage in refrigerator; do not store in plastic; use only fresh sol

• Reassurance if communication is difficult during recovery from neuromuscular blockade

• Frequent (q2hr) instillation of artificial tears, covering of eyes to prevent drying of cornea

Evaluate:

• Therapeutic response: paralysis of jaw, eyelid, head, neck, rest of body

TREATMENT OF OVERDOSE:

Neostigmine, atropine, monitor VS; may require mechanical ventilation

panitumumab (Rx)

(pan-i-tue'moo-mab)

Vectibix

Func. class.: Antineoplastic—miscellaneous

Chem. class.: Multikinase inhibitor, signal transduction inhibitor

ACTION: Decreases growth and survival of cancer cells by competitive inhibition of EGF receptor

USES: EGFR expressing metastatic colorectal cancer; not beneficial with KRAS mutations in codon 12 or 13

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (C), breastfeeding, children, hepatic disease, acute bronchospasm, diarrhea, hamster protein allergy, hypomagnesemia, hypotension, pulmonary fibrosis, sepsis, KRAS mutations

Black Box Warning: Exfoliative dermatitis, infusion-related reactions

DOSAGE AND ROUTES

• **Adult: IV INF** 6 mg/kg over 60 min every 2 wk; doses >1000 mg over 90 min

Available forms: Sol for inj 20 mg/ml (100 mg/5 ml, 400 mg/20 ml)

Administer:

Intermittent IV INF route

• Give in hospital or clinic setting with full resuscitation equipment

• Only as IV inf using controlled IV inf pump; do not give IV push or bolus; use low-protein binding 0.2- or 0.22-micron in-line filter; flush line with 0.9% NaCl before and after administration

• Give over 60 min through a peripheral line or indwelling catheter; infuse doses of >1000 mg over 90 min

• Dilute in 100 ml of 0.9% NaCl; dilute doses >1000 mg in 150 ml of 0.9%

NaCl; mix by inverting; do not exceed 10 mg/ml; use within 6 hr if stored at room temp; can be stored between 2° C and 8° C for up to 24 hr

- **Dosage adjustment for infusion/dermatologic reaction**
- Grade 1 or 2: reduce infusion by 50%; Grade 3 or 4: terminate, permanently discontinue depending on severity/resistance

SIDE EFFECTS

CNS: Fatigue
CV: Peripheral edema
EENT: Ocular irritation, ocular toxicity
GI: *Nausea, diarrhea, vomiting,* anorexia, mouth ulceration, abdominal pain, constipation
HEMA: Thrombophlebitis
INTEG: *Rash,* pruritus, exfoliative dermatitis, skin fissure, angioedema, severe/fatal INF reactions
META: Hypocalcemia, hypomagnesemia, antibody formation
RESP: Bronchospasm, cough, dyspnea, hypoxia, pulmonary fibrosis/embolism, pneumonitis, wheezing, interstitial lung disease

PHARMACOKINETICS

Bioavailability 38%-49%; elimination half-life 7.5 days; peak 3 hr; high-fat meal decreases bioavailability; plasma protein binding 99.5%; metabolized in liver; oxidative metabolism by CYP3A4, glucuronidation by UGT1A9; 77% excreted in feces

INTERACTIONS

- Do not use in combination with other antineoplastics

NURSING CONSIDERATIONS

Assess:

Black Box Warning: **Serious skin disorders:** fever, sore throat, fatigue, then lesions in mouth, lips; withhold product, notify prescriber

- Serum electrolytes periodically (calcium, magnesium)
- **Infection:** increased temp

Black Box Warning: **Inf reactions:** bronchospasm, fever, chills, hypotension; may require discontinuation, have emergency equipment available

- **Ocular toxicity:** ocular irritation, hyperemia
- **Pulmonary fibrosis:** dyspnea, cough, wheezing; may require discontinuation

Perform/provide:

- Storage of unopened vials in refrigerator; do not shake; protect from direct sunlight; do not freeze

Evaluate:

- Therapeutic response: decrease in colon carcinoma progression

Teach patient/family:

⚠ To report adverse reactions immediately: difficulty breathing, mouth sores, skin rash, ocular toxicity

- About reason for treatment, expected results, adverse reactions
- To use contraception while taking product, for 6 mo after treatment; not to breastfeed for ≥2 mo after stopping treatment
- To avoid the sun, use sunscreen while taking product

P

pantoprazole (Rx)

(pan-toe-pray'zole)

Panto ♣, Pantoloc ♣, Protonix, Prontonix IV

Func. class.: Proton pump inhibitor
Chem. class.: Benzimidazole

ACTION: Suppresses gastric secretion by inhibiting hydrogen/potassium ATPase enzyme system in gastric parietal cell; characterized as gastric acid pump inhibitor because it blocks the final step of acid production

USES: Gastroesophageal reflux disease (GERD), severe erosive esophagitis;

maintenance of long-term pathologic hypersecretory conditions, including Zollinger-Ellison syndrome

Unlabeled uses: Duodenal/gastric ulcer, NSAID ulcer prophylaxis, *Helicobacterpylori*–associated ulcer, dyspepsia

CONTRAINDICATIONS:

Hypersensitivity to this product or benzimidazole

Precautions: Pregnancy (C), breastfeeding, children, proton pump hypersensitivity

DOSAGE AND ROUTES

GERD

- **Adult: PO** 40 mg/day × 8 wk, may repeat course

Erosive esophagitis

- **Adult: IV** 40 mg/day × 7-10 day; **PO** 40 mg/day × 8 wk; may repeat **PO** course

Pathologic hypersecretory conditions

- **Adult: PO** 40 mg bid; **IV** 80 mg q12hr, max 240 mg/day

Duodenal ulcer/gastric ulcer/ NSAID ulcer prophylaxis (unlabeled)

- **Adult: PO** 40 mg/day

***H. pylori*–associated ulcers (unlabeled)**

- **Adult: PO** 40 mg bid; may be used with other products

Available forms: Del rel tabs 20, 40 mg; powder for inj 40 mg/vial; del rel granules for susp 40 mg

Administer:

PO route

- Swallow del rel tabs whole; do not break, crush, or chew; take del rel tabs at same time of day
- May take with/without food
- **Suspension:** give in apple juice 30 min before a meal or sprinkled on 1 Tbsp of applesauce
- **NG tube:** Empty contents of packet of granules into barrel of a 60 ml catheter tip syringe (plunger removed) connected to ≥16F NG tube, add 10 ml apple juice and tap or shake barrel of syringe to empty into the tube; add another 10 ml of apple juice, rinse with additional apple juice until syringe is clear

IV route

- Use of Protonix IV vials with spiked IV system adaptors is not recommended
- Visually inspect for particulate matter and discoloration before use
- Give as an IV infusion over 15 min either through a dedicated line or a Y-site; a 2-min slow-injection regimen is also approved, do not give fast IV push
- When using a Y-site, immediately stop use if a precipitation or discoloration occurs
- **Reconstitution of vial:** Use 40 mg vial/10 ml NS, do not freeze
- **Two-minute slow IV infusion injection:** Dilute one or two 40-mg vials with 10 ml NS per vial to 4 mg/ml, store ≤24 hr at room temperature before use; infuse slowly over ≥2 min; do not give with other IV fluids or medications; flush line with D_5W, NS, or LR before and after each dose
- **Fifteen-minute IV infusion:** Dilute each 40-mg dose with 10 ml NS; the reconstituted vial should be further admixed with 100 ml (for one vial) or 80 ml (for 2 vials) of D_5W, NS, or LR (to 0.4 mg/ml or 0.8 mg/ml, respectively); store ≤6 at room temperature before further dilution; the admixed solution (0.4 mg/ml or 0.8 mg/ml) may be stored at room temperature and must be used within 24 hr from the time of initial reconstitution; infuse over 15 min at 7 ml/min; do not administer with other IV fluids or medications; flush IV line with D_5W, NS, or LR before and after each dose

Y-site compatibilities: Acyclovir, allopurinol, amifostine, amikacin, aminocaproic acid, aminophylline, amoxicillin-clavulanate, amphotericin B liposome, ampicillin, ampicillin-sulbactam, anidulafungin, azithromycin, bleomycin, bumetanide, calcium gluconate, CARBOplatin, carmustine, ceFAZolin, cefOXitin,

cefTAZidime, ceftizoxime, cefTRIAXone, cefuroxime, clindamycin, cyclophosphamide, cycloSPORINE, cytarabine, dextrose 3.3% in sodium chloride 0.3%, digoxin, dimenhyDRINATE, DOCEtaxel, DOPamine, doripenem, doxycycline, enalaprilat, EPINEPHrine, ertapenem, fluorouracil, foscarnet, fosphenytoin, furosemide, ganciclovir, gentamicin, granisetron, heparin, hydrocortisone HYDROmorphone, imipenem-cilastatin, inamrinone, insulin (regular), irinotecan, isoproterenol, magnesium, mannitol, mesna, methohexital, methyldopate, metoclopramide, nafcillin, nitroglycerin, nitroprusside, ofloxacin, oxytocin, PACLitaxel, pentazocine, PENTobarbital, phenylephrine, piperacillin-tazobactam, potassium chloride, procainamide, rifampin, sodium bicarbonate, succinylcholine, SUFentanil, sulfamethoxazole-trimethoprim, teniposide, theophylline, thiopental, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, tobramycin, traMADol, vasopressin, zidovudine

SIDE EFFECTS

CNS: *Headache,* insomnia, asthenia, fatigue, malaise, insomnia, somnolence
GI: *Diarrhea, abdominal pain,* flatulence, pancreatitis, weight changes
INTEG: *Rash*
META: Hyperglycemia, weight gain/loss, hyponatremia, hypomagnesemia
MS: Rhabdomyolysis, myalgia
RESP: Pneumonia
SYST: Stevens-Johnson syndrome, toxic epidermal necrolysis, anaphylaxis, angioedema

PHARMACOKINETICS

Peak 2.4 hr, duration >24 hr, half-life 1.5 hr, protein binding 97%, eliminated in urine as metabolites and in feces; in geriatric patients, elimination rate decreased; some Asian patients (15%-20%) may be poor metabolizers

INTERACTIONS

Increase: pantoprazole serum levels—diazepam, phenytoin, flurazepam, triazolam, clarithromycin
Increase: bleeding—warfarin
Decrease: absorption of these products—sucralfate, calcium carbonate, vit B_{12}, ketoconazole, itraconazole, atazanavir, ampicillin, iron salts
Decrease: clopidogrel effect
Drug/Herb
Decrease: effect of pantoprazole—St. John's wort

NURSING CONSIDERATIONS

Assess:
- **GI system:** bowel sounds q8hr; abdomen for pain, swelling; anorexia
- **Hepatic studies:** AST, ALT, alk phos during treatment
- For vit B_{12} deficiency in patients receiving long-term therapy

⚠ **Serious skin reactions:** toxic epidermal necrolysis, Stevens-Johnson syndrome, exfoliative dermatitis: fever, sore throat, fatigue, thin ulcers; lesions in the mouth, lips

- **Electrolyte imbalances:** hyponatremia; hypomagnesemia in patients using product 3 mo to 1 year; if hypomagnesemia occurs, use of magnesium supplements may be sufficient; if severe, discontinuation of product may be required

⚠ **Rhabdomyolysis, myalgia:** muscle pain, increased CPK; weakness, swelling of affected muscles

Evaluate:
- Therapeutic response: absence of epigastric pain, swelling, fullness

Teach patient/family:
- To report severe diarrhea; black, tarry stools; abdominal pain; product may have to be discontinued
- That hyperglycemia may occur in diabetic patients
- To avoid alcohol, salicylates, NSAIDs; may cause GI irritation
- To notify prescriber if pregnant or planning to become pregnant; not to breastfeed

P

• To continue taking even if feeling better

paricalcitol (Rx)

(par-ih-cal'sih-tol)

Zemplar

Func. class.: Vit D analog

Chem. class.: Fat-soluble vitamin

ACTION: Reduces parathyroid hormone (PTH) levels; suppresses PTH levels in patients with chronic renal failure with absence of hypercalcemia/hyperphosphatemia; serum PO_4, calcium, CaXP may increase

USES: Hyperparathyroidism in chronic renal failure

Unlabeled uses: Renal osteodystrophy

CONTRAINDICATIONS: Hypersensitivity, hypercalcemia

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, CV disease, renal calculi

DOSAGE AND ROUTES

• **Adult: IV BOL** 0.04-0.1 mcg/kg (2.8-7 mcg) no more than every other day during dialysis; may increase by 2-4 mcg q2-4wk until target serum intact PTH (1.5−3× nonuremic upper limit of normal) achieved; **PO** 1 mcg/day or 2 mcg 3×/wk (IPTH ≤500 pg/ml); 2 mcg/day or 4 mcg 3×/wk (IPTH >500 pg/ml)

Available forms: Inj 2, 5 mcg/ml; caps 1, 2, 4 mcg

Administer:

PO route

• Daily or 3×/wk; may give without regard to food

IV route

• By IV bolus only

SIDE EFFECTS

CNS: Lightheadedness

CV: Palpitations

GI: Nausea, vomiting, anorexia, dry mouth

OTHER: Pneumonia, edema, chills, fever, flu, sepsis

PHARMACOKINETICS

Crosses placenta, enters breast milk

INTERACTIONS

Decrease: paricalcitol effect—cholestyramine, colestipol, mineral oil, orlistat, corticosteroids, barbiturates, hydantoins, CYP3A4 enzymes (nevirapine, rifampin, bosentan)

Increase: calcium levels—thiazide diuretics, calcium products, vit D supplements

Increase: effect of cardiac glycosides

Altered: paricalcitol effect—CYP3A4 inhibitors (amiodarone, protease inhibitors, systemic azole antifungals, chloramphenicol, clarithromycin, delavirdine, erythromycin)

NURSING CONSIDERATIONS

Assess:

• **Hypocalcemia:** twitching, dysrhythmias, Chvostek's/Trousseu's signs, paresthesia, laryngospasm, prolonged QTc/ST interval

• Serum calcium, serum intact parathyroid hormone concentrations (iPTH), phosphate 2×/wk during initial therapy; after dose is established, take calcium and phosphorus monthly

Evaluate:

• Decreased hypoparathyroidism with chronic renal disease, normal serum calcium, phosphate, iPTH

Teach patient/family:

• To report weakness, lethargy, headache, anorexia, loss of weight

• To report nausea, vomiting, palpitations

• To adhere to dietary regimen of calcium supplementation/phosphorus restriction

• To avoid excessive use of aluminum compounds, antacids

• Not to breastfeed

• Not to take mineral oil, antacids (magnesium) while taking vit D

PAROxetine (Rx)

(par-ox′e-teen)

Paxil, Paxil CR, Pexeva

Func. class.: Antidepressant, SSRI

Chem. class.: Phenylpiperidine derivative

Do not confuse:
PAROxetine/PACLitaxel
Paxil/PACLitaxel/Taxol

ACTION: Inhibits CNS neuron uptake of serotonin but not of norepinephrine or dopamine

USES: Major depressive disorder, obsessive-compulsive disorder, panic disorder, generalized anxiety disorder, posttraumatic stress disorder, premenstrual disorders, social anxiety disorder
Unlabeled uses: Premature ejaculation, hot flashes, menopause

CONTRAINDICATIONS: Pregnancy (D), hypersensitivity, MAOI use, alcohol use
Precautions: Breastfeeding, geriatric patients, seizure history; patients with history of mania, renal/hepatic disease

Black Box Warning: Children, suicidal ideation

DOSAGE AND ROUTES

Generalized anxiety disorder
- **Adult: PO** 20 mg/day in AM, range 20-50 mg/day

Posttraumatic stress disorder
- **Adult: PO** 20 mg/day, range 20-60 mg/day

Depression
- **Adult: PO** 20 mg/day in AM; after 4 wk, if no clinical improvement is noted, dose may be increased by 10 mg/day each wk to desired response, max 50 mg/day or **CONT REL** 25 mg/day, may increase by 12.5 mg/day/wk up to 62.5 mg/day
- **Geriatric: PO** 10 mg/day, increase by 10 mg to desired dose, max 40 mg/day

Obsessive-compulsive disorder
- **Adult: PO** 40 mg/day in AM, start with 20 mg/day, increase in 10-mg/day increments, max 60 mg/day

Panic disorder
- **Adult: PO** Start with 10 mg/day, increase in 10-mg/day increments to 40 mg/day, max 60 mg/day or **CONT REL** 12.5 mg/day, max 75 mg/day

Premenstrual disorders
- **Adult: CONT REL** 12.5 mg/day in AM

Renal dose
- **Adult: PO** CCr 30-60 ml/min, lower doses may be needed; CCr <30 ml/min, 10 mg/day initially, regular rel, max 40 mg/day; **CONT REL** 12.5 mg/day initially, max 50 mg/day

Hepatic dose
- **Adult: PO** 10 mg/day initially, max 40 mg **regular rel;** 12.5 mg/day initially, max 50 mg/day **(cont rel)**

Menopause symptoms/hot flashes (unlabeled)
- **Adult: PO (CONT REL)** 12.5 mg/day, may increase to 25 mg/day after 1 wk

Premature ejaculation (unlabeled)
- **Adult: PO** 20 mg/day

Available forms: Tabs 10, 20, 30, 40 mg; oral susp 10 mg/5 ml; cont rel tab 12.5, 25, 37.5 mg

Administer:
- Do not substitute Pexeva with Paxil, Paxil CR, or generic PAROxetine
- Increased fluids, bulk in diet for constipation, urinary retention
- With food, milk for GI symptoms
- Crushed if patient is unable to swallow medication whole (regular rel only)
- Gum, hard candy, frequent sips of water for dry mouth
- Avoid use with other CNS depressants
- **Oral susp:** shake, measure with oral syringe or calibrated measuring device
- **Cont rel tab:** do not cut, chew, crush; do not give concurrently with antacids

SIDE EFFECTS

CNS: *Headache,* nervousness, insomnia, *drowsiness, anxiety, tremor, dizziness,* fatigue, *sedation,* abnormal dreams, agi-

tation, apathy, euphoria, hallucinations, delusions, psychosis, seizures, neuroleptic-malignant-syndrome–like reactions, restless leg syndrome
CV: Vasodilation, postural hypotension, palpitations, bleeding
EENT: Visual changes
GI: *Nausea, diarrhea, dry mouth,* anorexia, dyspepsia, *constipation,* cramps, vomiting, taste changes, flatulence, decreased appetite
GU: Dysmenorrhea, decreased libido, urinary frequency, UTI, amenorrhea, cystitis, impotence; decreased sperm quality, decreased fertility, *abnormal ejaculation (male)*
INTEG: *Sweating,* rash
MS: Pain, arthritis, myalgia, myopathy, myosthenia
RESP: Infection, pharyngitis, nasal congestion, sinus headache, sinusitis, cough, dyspnea, yawning
SYST: Asthenia, fever, abrupt withdrawal syndrome

PHARMACOKINETICS

PO: Peak 5.2 hr, ext rel peak 6-10 hr; metabolized in liver by CYP2D6 enzyme system, unchanged products and metabolites excreted in feces and urine; half-life 21 hr (reg rel); 15-20 hr (cont rel); protein binding 95%

INTERACTIONS

⚠ **Increase:** serotonin syndrome—SSRIs, SNRIs, atypical psychotics, serotonin-receptor agonists, tricyclics, amphetamines, methylphenidate, traMADol
Decrease: level of digoxin
⚠ Do not use with MAOIs, pimozide, thioridazine; potentially fatal reactions can occur
Increase: bleeding—NSAIDs, thrombolytics, salicylates, platelet inhibitors, anticoagulants
Increase: PARoxetine plasma levels—cimetidine
Increase: agitation—L-tryptophan
Increase: side effects—highly protein-bound products
Increase: theophylline levels—theophylline
Increase: toxicity—CYP2D6 inhibitors (aprepitant, delavirdine, imatinib, nefazodone)
Decrease: PARoxetine levels—PHENobarbital and phenytoin
Drug/Herb
• Avoid use with St. John's wort, kava
• Possible serotonin syndrome: St. John's wort
• Hypertensive crisis: ephedra

NURSING CONSIDERATIONS

Assess:

Black Box Warning: **Depression/OCD/anxiety/panic attacks:** mental status: mood, sensorium, affect, suicidal tendencies (especially in child/young adult), increase in psychiatric symptoms, decreasing obsessive thoughts, compulsive behaviors, restrict amount available

• **Postural hypotension:** B/P (lying/standing), pulse q4hr; if systolic B/P drops 20 mm Hg, hold product, notify prescriber; take vital signs q4hr for patients with CV disease
• Hepatic/renal studies: AST, ALT, bilirubin, creatinine
• Weight weekly; appetite may decrease with product, constipation
• ECG for flattening of T wave, bundle branch or AV block, dysrhythmias in cardiac patients
• EPS, primarily in geriatric patients: rigidity, dystonia, akathisia
• **Renal status:** BUN, creatinine, urinary retention
• **Withdrawal symptoms:** headache, nausea, vomiting, muscle pain, weakness; not usual unless product discontinued abruptly, taper over 1-2 wk
• Alcohol intake; if alcohol is consumed, hold dose until morning
⚠ **Serotonin, neuroleptic malignant syndrome:** hallucinations, coma, headache, agitation, shivering, sweating, tachycardia, diarrhea, tremor, hypertension, hyperthermia, rigidity, delirium, coma, myoclonus, agitation, nausea, vomiting

Perform/provide:
- Storage at room temp; do not freeze

Evaluate:
- Therapeutic response: decreased depression

Teach patient/family:
- That therapeutic effect may take 1-4 wk
- To use caution when driving, performing other activities requiring alertness because of drowsiness, dizziness, blurred vision
- Not to discontinue medication quickly after long-term use; may cause nausea, headache, malaise (abrupt withdrawal syndrome)

Black Box Warning: That depression may worsen, suicidal thoughts/behaviors; children/adolescents, young adults, to notify prescriber

- To avoid alcohol ingestion, OTC products unless approved by prescriber
- To report bleeding, headache, nausea, anxiety, or if depression continues
- To discuss sexual side effects: impotence, possible male infertility while taking product

TREATMENT OF OVERDOSE:
Gastric lavage, airway; for seizures, give diazepam, symptomatic treatment

pegfilgrastim (Rx)
(peg-fill-grass'stim)

Neulasta

Func. class.: Hematopoietic agent

Chem. class.: Granulocyte colony-stimulating factor

ACTION:
Stimulates proliferation and differentiation of neutrophils

USES:
To decrease infection in patients receiving antineoplastics that are myelosuppressive; to increase WBC count in patients with product-induced neutropenia

CONTRAINDICATIONS:
Hypersensitivity to proteins of *Escherichia coli*, filgrastim

Precautions: Pregnancy (C), breastfeeding, children <45 kg, adolescents, myeloid malignancies, sickle cell disease, leukocytosis, splenic rupture, ARDS, allergic-type reactions, peripheral blood stem cell (PBSC) mobilization

DOSAGE AND ROUTES
- **Adult: SUBCUT** 6 mg, give 1× per chemotherapy cycle

Available forms: Sol for inj 6 mg/0.6 ml

Administer:

SUBCUT route
- Using single-use vials; after dose is withdrawn, do not reenter vial
- Do not use 6-mg fixed dose in infants, children, or others <45 kg
- Inspect sol for discoloration, particulates; if present, do not use
- Do not administer during the period 14 days before and 24 hr after cytotoxic chemotherapy

SIDE EFFECTS
CNS: Fever, fatigue, headache, dizziness, insomnia, peripheral edema

GI: *Nausea*, vomiting, diarrhea, mucositis, anorexia, constipation, dyspepsia, abdominal pain, stomatitis, splenic rupture

HEMA: Leukocytosis, granulocytopenia, sickle cell crisis, hemoglobin S disease with crisis

INTEG: Alopecia

MISC: Chest pain, hyperuricemia, anaphylaxis, influenza-like illness, angioedema, antibody formation

MS: Skeletal pain

RESP: Respiratory distress syndrome

PHARMACOKINETICS
Half-life: 15-80 hr; 20-38 hr (children)

P

INTERACTIONS

• Do not use product concomitantly, 2 wk before, or 24 hr after administration of cytotoxic chemotherapy

Increase: release of neutrophils—lithium

Drug/Lab Test

Increase: uric acid, LDH, alk phos

NURSING CONSIDERATIONS

Assess:

⚠ **Allergic reactions, anaphylaxis:** rash, urticaria; discontinue product, have emergency equipment nearby

⚠ **ARDS:** dyspnea, fever, tachypnea, occasionally confusion; obtain ABGs, chest x-ray; product may need to be discontinued

• **Bone pain;** give mild analgesics

• Blood studies: CBC with differential, platelet count before treatment, 2× weekly; neutrophil counts may be increased for 2 days after therapy

• B/P, respirations, pulse before and during therapy

Perform/provide:

• Storage in refrigerator; do not freeze; may store at room temp up to 6 hr; avoid shaking, protect from light

Evaluate:

• Therapeutic response: absence of infection

Teach patient/family:

• How to perform the technique for self-administration if product to be given at home: dose, side effects, disposal of containers and needles; provide instruction sheet

• To notify prescriber immediately of allergic reaction, trouble breathing, abdominal pain

peginterferon alfa-2a (Rx)

(peg-in-ter-feer'on)

Pegasys

peginterferon alfa-2b (Rx)

PegIntron, SYLATRON

Func. class.: Immunomodulator

ACTION: Stimulates genes to modulate many biologic effects, including the inhibition of viral replication; inhibits ion cell proliferation, immunomodulation; stimulates effector proteins; decreases leukocyte, platelet counts

USES: Chronic hepatitis C infections in adults with compensated liver disease; chronic hepatitis B in adults who are HBe AG positive, HBe AG negative; HCV patients coinfected with HIV; nonresponders or relapsers with chronic hepatitis C, malignant melanoma

Unlabeled uses: Adenovirus, coronavirus, encephalomyocarditis virus, herpes simplex types 1 and 2, hepatitis D, acute hepatitis C, HIV, HPV, polio virus, rhinovirus, varicella-zoster, variola, vesicular stomatitis

CONTRAINDICATIONS: Neonates, infants, sepsis; hypersensitivity to interferons, benzyl alcohol, *Escherichia coli* protein

Precautions: Pregnancy (C), breastfeeding, children <18 yr, geriatric patients, thyroid disorders, myelosuppression, renal/hepatic disease, suicidal/homicidal ideation, preexisting ophthalmologic disorders, pancreatitis, hemodialysis

Black Box Warning: Cardiac disease, depression, autoimmune disease, infection, use with ribavirin

DOSAGE AND ROUTES

Pegasys

• **Adult: SUBCUT** 180 mcg q wk × 48 wk; if poorly tolerated, reduce dose to 135 mcg q wk; in some cases, reduction to 90 mcg may be needed

Peg-Intron

(chronic hepatitis C with compensated liver disease)

• **Adult >105 kg: SUBCUT** 1.5 mcg/kg/wk plus ribavirin 600 mg in AM and 800 mg in PM plus a HCV NS3/4A protease inhibitor; **86-105 kg:** 150 mcg/0.5 ml (0.5 ml of 150 mcg vial or Redipen) per wk plus ribavirin 1200 mg/day in 2 divided doses plus a HCV NS3/4A protease inhibitor; **81-85 kg:** 120 mcg/0.5 ml (0.5 ml of 120 mcg vial or Redipen) per wk plus ribavirin 1200 mg/day in 2 divided doses plus a HCV NS3/4A protease inhibitor; **76-80 kg:** 120 mcg/0.5 ml (0.5 ml of 120 mcg vial or Redipen) per wk plus ribavirin 400 mg in AM and 600 mg in PM plus a HCV NS3/4A protease inhibitor; **66-75 kg:** 96 mcg/0.4 ml (0.4 ml of 120 mcg vial or Redipen) per wk plus ribavirin 400 mg in AM and 600 mg in PM plus a HCV NS3/4A protease inhibitor; **61-65 kg:** 96 mcg/0.4 ml (0.4 ml of 120 mcg vial or Redipen) per wk plus ribavirin 800 mg/day in 2 divided doses plus a HCV NS3/4A protease inhibitor; **51-60 kg:** 80 mcg/0.5 ml (0.5 ml of 80 mcg vial or Redipen) per wk plus ribavirin 800 mg/day in 2 divided doses plus a HCV NS3/4A protease inhibitor; **40-50 kg:** 64 mcg/0.4 ml (0.4 ml of 80 mcg vial or Redipen) per wk plus ribavirin 800 mg/day in 2 divided doses plus a HCV NS3/4A protease inhibitor; **<40 kg:** 50 mcg/0.5 ml (0.5 ml of 50 mcg vial or Redipen) per wk plus ribavirin 800 mg/day in 2 divided doses plus a HCV NS3/4A protease inhibitor

Malignant Melanoma (SYLATRON only)

• **Adult: SUBCUT** 6 mcg/kg/wk × 8 wk then 3 mcg/kg/wk × ≤5 yr, premedicate with acetaminophen 500-1000 mg 30 min prior to first dose, prn for subsequent doses

Available forms: Pegasys: inj 180 mcg/0.5 ml; Pegintron: 50, 80, 120, 150 mcg/0.5 ml; SYLATRON 296, 444, 888 mcg powder for inj

Administer:

• In evening to reduce discomfort, to allow patient to sleep through some side effects

• Continue pediatric dose in those who turn 18 yr

Interferon alfa-2a

• Use prefilled syringes, store in refrigerator

Interferon alfa-2b

SUBCUT/IM route

• Reconstitute with 1 ml of provided diluent/10-, 18-, or 50-million unit vials, swirl; sol for inj vials do not need reconstitution

SIDE EFFECTS

CNS: *Headache, insomnia, dizziness,* anxiety, hostility, lability, nervousness, depression, fatigue, poor concentration, pyrexia, **suicidal ideation, homicidal ideation,** relapse of drug addiction, emotional lability, mania, psychosis

CV: **Ischemic CV events**

ENDO: Hypothyroidism, diabetes

GI: *Abdominal pain, nausea, diarrhea, anorexia, vomiting,* dry mouth, **fatal colitis, fatal pancreatitis**

HEMA: **Thrombocytopenia,** neutropenia, anemia, lymphopenia

INTEG: *Alopecia, pruritus, rash,* dermatitis

MISC: Blurred vision, inj site reaction, rigors

MS: *Back pain,* myalgia, arthralgia

RESP: Cough, dyspnea

PHARMACOKINETICS

Half-life 15-80 hr, large variability in other pharmacokinetics

INTERACTIONS

• Use caution when giving with theophylline, myelosuppressive agents

Increase: hepatic damage-NNRTIs, NRTIs, protein inhibitors

Drug/Lab Test
Increase: triglycerides, ALT, neutrophils, platelets
Abnormal: thyroid function test

NURSING CONSIDERATIONS

Assess:
• **Neuropsychiatric symptoms:** severe depression with suicidal ideation; monitor q3wk then 8 wk then q6mo
• B/P, blood glucose, ophthalmic exam, pulmonary function
• ALT, HCV viral load; patients who show no reduction in ALT, HCV unlikely to show benefit of treatment after 6 mo
• Platelet counts, heme concentration, ANC, serum creatinine concentration, albumin, bilirubin, TSH, T_4, AFP
⚠ **Myelosuppression:** hold dose if neutrophil count is $<500 \times 10^6$/L or if platelets are $<50 \times 10^9$/L
• **Hypersensitivity:** discontinue immediately if hypersensitivity occurs
• **Infection:** vital signs, increased WBCs, fever; product may need to be discontinued
⚠ **Colitis/pancreatitis:** may be fatal; diarrhea, fever, nausea, vomiting, severe abdominal pain; if these occur, product should be discontinued

Evaluate:
• Therapeutic response: decreased chronic hepatitis C signs, symptoms; undetectable viral load

Teach patient/family:
• Provide patient or family member with written, detailed information about product
• Use 2 forms of effective contraception throughout treatment and for 6 mo after treatment (men and women) (combination therapy with ribavirin)
• To avoid driving, other hazardous activity if dizziness, confusion, fatigue, somnolence occur
• To use puncture-resistant container for disposal of needles/syringes if using at home
⚠ To report suicidal/homicidal ideation, visual changes, bleeding/bruising, pulmonary symptoms

pegloticase (Rx)

(peg-loe'ti-kase)
Krystexxa
Func. class.: Antigout agent
Chem. class.: Pegylated, recombinant, mammalian urate oxidase enzyme

ACTION: Lowers plasma uric acid concentration by converting uric acid to allantoin, which is readily excreted by the kidneys

USES: Chronic gout in patients experiencing treatment failure

CONTRAINDICATIONS: Hypersensitivity, G6PD deficiency
Precautions: Pregnancy (C), breastfeeding, children/infants/neonates, African-American patients, heart failure
Black Box Warning: Requires specialized setting, experienced clinician

DOSAGE AND ROUTES

• **Adult: IV INF** 8 mg over 2 hr q2wk
Available forms: Sol for inj 8 mg/ml
Administer:
Intermittent IV INF route
• ***Reconstitute:*** Visually inspect for particulate matter, discoloration whenever sol/container permits, use aseptic technique, withdraw 8 mg (1 ml) of product/250 ml 0.9% NaCl or 0.45% NaCl, invert several times to mix, do not shake; discard remaining product in vial
• ***Premedicate:*** With antihistamines and corticosteroids in all patients and acetaminophen if deemed necessary to prevent anaphylaxis, inf site reactions
• ***Infusion:*** If refrigerated, allow to come to room temp, do not warm artificially; give over 120 min, do not give IV push or bolus; use inf by gravity feed, syringe-type pump, or inf pump; given in a specialized setting by those who can manage anaphylaxis or inj site reactions;

monitor during and for 1 hr after infusion; if reaction occurs, slow or stop infusion, may be restarted at a slower rate; do not admix
• Storage of diluted product in refrigerator or at room temp for up to 4 hr; refrigerator is preferred, protect from light, do not freeze, use within 4 hr of preparation

SIDE EFFECTS

CNS: Dizziness, fatigue, fever
CV: *Chest pain,* heart failure, hypotension
GI: *Nausea,* vomiting, diarrhea, constipation
GU: Nephrolithiasis
HEMA: Anemia
INTEG: Ecchymosis, *erythema, pruritus, urticaria*
MS: Back pain, arthralgia, muscle spasm
SYST: Antibody formation, infection, anaphylaxis, infusion-related reactions
RESP: *Dyspnea,* upper respiratory infection

PHARMACOKINETICS

Remains primarily in intravascular space after administration, elimination half-life 2 wk, mean nadir uric acid concentration 24-72 hr

Interactions

Do not use with urate-lowering agents (allopurinol, probenecid, febuxostat, sulfinpyrazone)

NURSING CONSIDERATIONS

Assess:

• **Gout:** pain in big toe, feet, knees, redness, swelling, tenderness lasting a few days to weeks; intake of alcohol, purines, if patient is overweight or taking diuretics
• Obtain uric acid levels at baseline, before administration; 2 consecutive uric acid levels of >6 mg/dl may indicate therapy failure; greater chance of anaphylaxis; infection-related reactions

Black Box Warning: Specialized care setting: use only in facility where emergency equipment is available, anaphylaxis may occur

Black Box Warning: Infusion reactions: monitor for reactions for ≥1 hr after use

Evaluate:

• Therapeutic response: decrease uric acid levels; relief of pain, swelling, redness in toes, feet, knees

Teach patient/family:

• About reason for inf, expected results
• To notify prescriber during inf of allergic reactions or redness, swelling, pain at inf site
• That continuing follow-up exams and uric acid levels will be needed

⚠ HIGH ALERT

PEMEtrexed (Rx)

(pem-ah-trex'ed)

Alimta

Func. class.: Antineoplastic-antimetabolite

Chem. class.: Folic acid antagonist

ACTION: Inhibits multiple enzymes that reduce folic acid, which is needed for cell replication

USES: Malignant pleural mesothelioma in combination with CISplatin; non–small-cell lung cancer as single agent; nonsquamous, non–small-cell lung cancer (1st-line treatment)
Unlabeled uses: Bladder, breast, colorectal, gastric, head/neck, pancreatic, renal cancers

CONTRAINDICATIONS: Pregnancy (D), hypersensitivity, ANC <1500 cells/mm^3, CCr <45 ml/min, thrombocytopenia (<100,000/mm^3), anemia
Precautions: Breastfeeding, children, renal/hepatic disease

DOSAGE AND ROUTES

• **Adult: IV INF** 500-600 mg/m^2 given over 10 min on day 1 of 21-day cycle with CISplatin 75 mg/m^2 infused over 2 hr beginning ½ hr after end of pemetrexed inf

Renal dose

- **Adult: IV INF** CCr <45 ml/min, not recommended

Available forms: Inj, single-use vials, 100, 500 mg

Administer:

- Vit B_{12} and low-dose folic acid as prophylactic measure to treat related hematologic, GI toxicity; 400-1000 mcg/day × 7 days prior to 1st dose and × 21 days after last dose, vit B_{12} 1 mg IM 1 wk prior to 1st dose and q 3 cycles (9 wk) thereafter
- Premedicate with corticosteroid (dexamethasone) given PO bid day before, day of, and day after administration of PEMEtrexed

Intermittent IV INF route

- Use cytotoxic handling procedures
- Reconstitute 500-mg vial/20 ml 0.9% NaCl inj (preservative free) = 25 mg/ml, swirl until dissolved, further dilute with 100 ml 0.9% NaCl inj (preservative free), give as IV inf over 10 mg
- Use only 0.9% NaCl inj (preservative free) for reconstitution, dilution
- Do not begin a new cycle unless neutrophils (ANC) are ≥1500 cells/mm^3, platelets are ≥100,000 cells/mm^3, CCr is ≥45 ml/min
- **Platelet nadir <50,000/mm^3 regardless of the ANC:** If necessary, delay until platelet count recovery, reduce PEMEtrexed and CISplatin by 50%; grade 3/4 toxicity occurs after 2 reductions, discontinue both products
- **ANC nadir <500/mm^3 when platelet nadir is ≥50,000/mm^3:** If necessary, delay until ANC recovery, reduce PEMEtrexed and CISplatin by 75%; if grade 3/4 toxicity occurs after 2 reductions, discontinue both products
- **CTC Grade 3/4 nonhematologic toxicity including diarrhea requiring hospitalization and excluding neurotoxicity, mucositis, and grade 3 transaminase elevations:** Withhold therapy until pretherapy value or condition, reduce by 75% both products, if grade 3 or 4 toxicity occurs after 2 reductions, discontinue both products
- **CTC grade 3/4 mucositis:** Withhold therapy until pretherapy condition, reduce 50% of PEMEtrexed, if grade 3 or 4 mucositis occurs after 2 dosage reductions, discontinue both products
- **CTC grade 2 neurotoxicity:** Withhold therapy until pretherapy value or condition, reduce dose of CISplatin by 50%
- **CTC grade 3/4 neurotoxicity:** discontinue both products

Y-site compatibilities: Acyclovir sodium, alfentanil, allopurinol, amifostine, amikacin, aminocaproic acid, aminophylline, amiodarone, amphotericin B lipid complex, amphotericin B liposome, ampicillin, ampicillin-sulbactam, atenolol, atracurium, azithromycin, aztreonam, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, CARBOplatin, carmustine, ceftizoxime, cefTRIAXone, cefuroxime, cimetidine, cisatracurium, CISplatin, clindamycin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, digoxin, diltiazem, diphenhydrAMINE, DOCEtaxel, dolasetron, DOPamine, doxacurium, enalaprilat, ePHEDrine, EPINEPHrine, eptifibatide, ertapenem, esmolol, etoposide, famotidine, fenoldopam, fentaNYL, fluconazole, fludarabine, fluorouracil, foscarnet, fosphenytoin, furosemide, ganciclovir, gatifloxacin, glycopyrrolate, granisetron, haloperidol, heparin, hydrocortisone, HYDROmorphone, hydrOXYzine, ifosfamide, imipenem-cilastatin, insulin (regular), isoproterenol, ketorolac, labetalol, leucovorin, levofloxacin, lidocaine, linezolid, LORazepam, magnesium, mannitol, meperidine, meropenem, mesna, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, midazolam, milrinone, mitoMYcin, mivacurium, morphine, moxifloxacin, nafcillin, naloxone, nesiritide, nitroglycerin, norepinephrine, octreotide, oxaliplatin, PACLitaxel, pamidronate, pancuronium, PENTobarbital, PHENobarbital, piperacillin-tazobactam, polymyxin B, potassium chloride/phosphates, procainamide,

promethazine, propranolol, ranitidine, remifentanil, rocuronium, sodium acetate/bicarbonate/phosphates, succinylcholine, SUFentanil, sulfamethoxazole-trimethoprim, tacrolimus, theophylline, thiopental, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, trimethobenzamide, vancomycin, vecuronium, verapamil, vinBLAStine, vinCRIStine, vinorelbine, zidovudine, zoledronic acid

SIDE EFFECTS

CNS: *Fatigue, fever, mood alteration, neuropathy*
CV: Thrombosis/embolism, *chest pain,* arrhythmia exacerbation
GI: *Nausea, vomiting, anorexia, diarrhea, ulcerative stomatitis, constipation, dysphagia, dehydration*
GU: Renal failure, creatinine elevation
HEMA: Neutropenia, leukopenia, thrombocytopenia, myelosuppression, anemia
INTEG: *Rash, desquamation*
RESP: *Dyspnea*
SYST: Infection with/without neutropenia, radiation recall reaction, toxic epidermal necrolysis, Stevens-Johnson syndrome, anaphylaxis

PHARMACOKINETICS

Not metabolized; excreted in urine (unchanged 70%-90%); not known if excreted in breast milk; half-life 3.5 hr, 81% protein binding

INTERACTIONS

Increase: bleeding risk—NSAIDs, anticoagulants, platelet inhibitors, salicylates, thrombolytics
Decrease: clearance of PEMEtrexed—nephrotoxic products

NURSING CONSIDERATIONS

Assess:
⚠ Previous radiation treatments; radiation recall reactions have occurred (erythema, exfoliative dermatitis, pain, burning)

⚠ **Bone marrow depression:** CBC, differential, platelet count; monitor for nadir, recovery; new cycle should not begin if ANC <1500 cells/mm³, platelets <100,000 cells/mm³, CCr <45 ml/min
• Renal studies: BUN, serum uric acid, urine CCr, electrolytes before, during therapy
• I&O ratio; report fall in urine output to <30 ml/hr
• Monitor temp q4hr; fever may indicate beginning infection; no rectal temp
⚠ **Neurotoxicity:** CTC grade 2: withhold until resolution to at least pretherapy value/condition, reduce CISplatin by 50%; CTC grade 3-4: immediately discontinue product and CISplatin if given in combination
• **Mucositis:** CTC 3-4: withhold until resolution to at least pretherapy value/condition, reduce dose by 50%; if grade ¾ occurs after 2 dosage reductions, discontinue product and CISplatin
• **Bleeding:** bleeding time, coagulation time during treatment; bleeding: hematuria, guaiac, bruising or petechiae, mucosa or orifices q8hr
• Buccal cavity q8hr for dryness, sores, ulceration, white patches, oral pain, bleeding, dysphagia
⚠ **Severe allergic reaction/toxic epidermal necrolysis:** rash, urticaria, itching, flushing

Perform/provide:
• Rinsing of mouth tid-qid with water, club soda; brushing of teeth bid-tid with soft brush or cotton-tipped applicators for stomatitis; use unwaxed dental floss
• Storage at 77° F, excursions permitted at 59° F to 86° F, not light sensitive, discard unused portions

Evaluate:
• Therapeutic response: decreased spread of malignancy

Teach patient/family:
• To report any complaints, side effects to nurse or prescriber: black, tarry stools, chills, fever, sore throat, bleeding, bruising, cough, SOB, dark or bloody urine

P

- To avoid foods with citric acid, hot or rough texture if stomatitis is present
- To report stomatitis: any bleeding, white spots, ulcerations in mouth to prescriber; to examine mouth daily, to report symptoms to nurse, to use good oral hygiene
- That contraceptive measures recommended during therapy, for #8 wk after cessation of therapy; to discontinue breastfeeding because toxicity to infant may occur
- To avoid alcohol, salicylates, live vaccines
- To avoid use of razors, commercial mouthwash
- To eat foods high in folic acid; to take supplements as prescribed

penciclovir topical
See Appendix B

PENICILLINS

penicillin G benzathine (Rx)
(pen-i-sill'in)
Bicillin L-A
penicillin G (Rx)
Pfizerpen
penicillin G procaine (Rx)
penicillin V (Rx)
Apo-Pen-VK ♣, Penicillin VK
Func. class.: Broad-spectrum antiinfective
Chem. class.: Natural penicillin

ACTION: Interferes with cell-wall replication of susceptible organisms; lysis is mediated by cell-wall autolytic enzymes, results in cell death

USES: Respiratory infections, scarlet fever, erysipelas, otitis media, pneumonia, skin and soft-tissue infections, gonorrhea; effective for gram-positive cocci *(Staphylococcus, Streptococcus pyogenes, S. viridans, S. faecalis, S. bovis, S. pneumoniae)*, gram-negative cocci *(Neisseria gonorrhoeae)*, gram-positive bacilli *(Actinomyces, Bacillus anthracis, Clostridium perfringens, C. tetani, Corynebacterium diphtheriae, Listeria monocytogenes)*, gram-negative bacilli *(Escherichia coli, Proteus mirabilis, Salmonella, Shigella, Enterobacter, Streptobacillus moniliformis)*, spirochetes *(Treponema pallidum)*

CONTRAINDICATIONS: Hypersensitivity to penicillins, corn
Precautions: Pregnancy (B), breastfeeding; hypersensitivity to cephalosporins, carbapenem, sulfites; severe renal disease, GI disease, asthma

DOSAGE AND ROUTES

Penicillin G benzathine

Early syphilis
- **Adult: IM** 2.4 million units in single dose

Congenital syphilis
- **Child <2 yr: IM** 50,000 units/kg in single dose, max 2.4 million units as single inj

Prophylaxis of rheumatic fever, glomerulonephritis
- **Adult: IM** 1.2 million units in single dose
- **Child >27 kg: IM** 900,000-1.2 million units as single dose
- **Child ≤27 kg: IM** 300,000-600,000 units as single dose

Upper respiratory infections (group A streptococcal)
- **Adult: IM** 1.2 million units as single dose
- **Child >27 kg: IM** 900,000-1.2 million units as single dose
- **Child <27 kg: IM** 300,000-600,000 units as single dose

Available forms: Inj 600,000 units/ml

Penicillin G

Pneumococcal/streptococcal infections (serious)

• **Adult: IM/IV** 5-24 million units in divided doses q4-6hr

• **Child <12 yr: IV** 150,000-300,000 units/kg/day in 4-6 divided doses; max 24 million units/day

Renal dose

• CCr <10 ml/min, give full loading dose then 1/2 of loading dose q8-10hr

Available forms: Powder for inj 1, 5, 20 million units/vial; inj 1, 2, 3 million units/50 ml

Penicillin G procaine

Moderate to severe pneumococcal infections

• **Adult/child: IM** 600,000-1 million units as single dose or divided bid doses/day for 10 days to 2 wk

Pneumococcal pneumonia

• **Adult/child >12 yr: IM** 600,000-1 million units/day × 7-10 days

Moderately severe group A streptococcal/staphylococcal pneumonia

• **Adult/adolescent/child ≥60 lbs: IM** 600,000-1 million units/day

• **Adolescent/child <60 lbs: IM** 300,000 units/day

Available forms: Inj 600,000, 1,200,000 units/unit dose

Penicillin V

Pneumococcal/staphylococcal infections

• **Adult/adolescents/child >12 yr: PO** 250-500 mg q6hr

• **Child <12 yr: PO** 25-50 mg/kg/day in divided doses q6-8hr; max 2 g/day

Streptococcal infections

• **Adult/adolescent/child ≥12 yr: PO** 125-250 mg q6-8hr × 10 days

• **Child <12 yr and >27 kg: PO** 500 mg q8 or 12 hr × 10 days

• **Child <12 yr and ≤27 kg: PO** 250 mg q8hr or q12hr or 40 mg/kg/day in 3 divided doses × 10 days

Prevention of recurrence of rheumatic fever/chorea

• **Adult: PO** 125-250 mg bid continuously

Vincent's gingivitis/pharyngitis

• **Adult: PO** 250-500 mg q6-8hr

Renal dose

• Dosage reduction indicated with renal impairment (CCr <50 ml/min) based on clinical response, degree of impairment

Available forms: Tabs 250, 500 mg; powder for oral sol 125, 250 mg/5 ml

Administer:

Penicillin G benzathine

• No dilution needed, shake well, deep IM inj in large muscle mass; avoid intravascular inj; aspirate; do not give IV

Penicillin G

• Penicillin G sodium or potassium can be given IM or IV, vials containing 10 or 20 million units not for IM use

Intermittent IV INF route

• Vials/bulk packages: dilute according to manufacturer's directions

• Frozen bags: thaw at room temp, do not force thaw, no reconstitution needed

• Final conc (100,000-500,000 units/ml—adults; 50,000 units/ml—neonate/infant)

• Total daily dose divided q4-6hr and given over 1-2 hr (adult), 15 min (infant/neonate)

Penicillin G potassium

Y-site compatibilities: Acyclovir, amiodarone, cyclophosphamide, diltiazem, enalaprilat, esmolol, fluconazole, foscarnet, heparin, HYDROmorphone, labetalol, magnesium sulfate, meperidine, morphine, perphenazine, potassium chloride, tacrolimus, theophylline, verapamil, vit B/C

Penicillin G procaine

• No dilution needed, give deep IM inj; avoid intravascular inj; aspirate; do not give IV

Penicillin V

• Orally on empty stomach for best absorption

• Oral susp: tap bottle to loosen, add 1/2 total amount of water, shake, add re-

maining water, shake; final conc (125 or 250 mg/ml) store in refrigerator after reconstitution, discard after 14 days

SIDE EFFECTS

CNS: Lethargy, hallucinations, anxiety, depression, twitching, coma, seizures, hyperreflexia
GI: *Nausea, vomiting, diarrhea,* increased AST, ALT, abdominal pain, glossitis, colitis, pseudomembranous colitis
GU: Oliguria, proteinuria, hematuria, *vaginitis, moniliasis,* glomerulonephritis, renal tubular damage
HEMA: Anemia, increased bleeding time, bone marrow depression, granulocytopenia, hemolytic anemia
META: Hypo/hyperkalemia, alkalosis, hypernatremia
MISC: Anaphylaxis, serum sickness, Stevens-Johnson syndrome, *local pain,* tenderness and fever with IM inj

PHARMACOKINETICS

Penicillin G benzathine:
IM: Very slow absorption; time to peak 12-24 hr; duration 21-28 days; excreted in urine, feces, breast milk; crosses placenta
Penicillin G:
IV: Peak immediate
IM: Peak ¼-½ hr
PO: Peak 1 hr, duration 6 hr
Excreted in urine unchanged, excreted in breast milk, crosses placenta, half-life 30-60 min
Penicillin G procaine:
IM: Peak 1-4 hr, duration 15 hr, excreted in urine
Penicillin V:
PO: Peak 30-60 min, half-life 30 min, excreted in urine, breast milk

INTERACTIONS

Increase: penicillin effect—aspirin, probenecid
Increase: effect of heparin, methotrexate
Decrease: effect of oral contraceptives, typhoid vaccine
Decrease: antimicrobial effect of penicillin—tetracyclines
Drug/Lab Test
False positive: urine glucose, urine protein

NURSING CONSIDERATIONS

Assess:
• **Infection:** temp; characteristics of sputum; wounds; urine; stools before, during, after treatment; C&S before therapy; product may be given as soon as culture is taken
• I&O ratio; report hematuria, oliguria because penicillin in high doses is nephrotoxic; renal tests: urinalysis, protein, blood
⚠ Any patient with compromised renal system because product is excreted slowly with poor renal system function; toxicity may occur rapidly
• Hepatic studies: AST, ALT
• Blood studies: WBC, RBC, Hct, Hgb, bleeding time
⚠ **Pseudomembranous colitis:** diarrhea, mucus, pus; bowel pattern before, during treatment
• Respiratory status: rate, character, wheezing, tightness in chest
⚠ Allergies before initiation of treatment, reaction of each medication; because of prolonged action, allergic reaction may be prolonged and severe; watch for anaphylaxis: rash, dyspnea, pruritus, laryngeal edema; skin eruptions after administration of penicillin to 1 wk after discontinuing product
Perform/provide:
• EPINEPHrine, suction, tracheostomy set, endotracheal intubation equipment
• Adequate fluid intake (2 L) during diarrhea episodes
• Scratch test to assess allergy after securing order from prescriber; usually done when penicillin is only product of choice
• Storage in dry, tight container; oral susp refrigerated 2 wk
Evaluate:
• Therapeutic response: resolution of infection

Teach patient/family:
- To report sore throat, fever, fatigue; may indicate superinfection; CNS effects: depression, hallucinations, seizures
- To wear or carry emergency ID if allergic to penicillins
- To report diarrhea, with blood, pus, mucous to prevent dehydration
- To shake susp well before each dose; to store in refrigerator for up to 2 wk
- To use all medication prescribed
- To use additional contraception if using any of these products

TREATMENT OF ANAPHYLAXIS: Withdraw product; maintain airway; administer EPINEPHrine, aminophylline, O_2, IV corticosteroids

pentamidine (Rx)

(pen-tam'i-deen)

Nebupent, Pentam 300

Func. class.: Antiprotozoal

Chem. class.: Aromatic diamide derivative

ACTION: Interferes with DNA/RNA synthesis in protozoa

USES: Treatment/prevention of *Pneumocystis jiroveci* infections
Unlabeled uses: *Leishmania/Trypanosoma* infections

CONTRAINDICATIONS: Hypersensitivity
Precautions: Pregnancy (C), breastfeeding, children, blood dyscrasias, cardiac/renal/hepatic disease, diabetes mellitus, hypocalcemia, hypo/hypertension, anemia

DOSAGE AND ROUTES

- **Adult and child ≥4 mo: IV/IM** 4 mg/kg/day × 2-3 wk; **NEB** 300 mg via specific nebulizer given q4wk for prevention

Available forms: Inj, aerosol 300 mg/vial; sol for aerosol 60 mg/vial ♣

Administer:
Inhalation route
- Through nebulizer, using Raspirgard II jet nebulizer; mix contents in 6 ml of sterile water; do not use low pressure (<20 psi); flow rate should be 5-7 L/min (40-50 psi) air or O_2 source over 30-45 min until chamber is empty

IM route
- 300 mg diluted in 3 ml sterile water; give deep IM by Z-track; if painful by this route, rotate inj site

Intermittent IV INF route
- Reconstitute 300 mg/3-5 ml of sterile water for inj, D_5W, withdraw dose and further dilute in 50-250 ml D_5W, give over 1-2 hr with patient lying down; check B/P often

Y-site compatibilities: Alfentanil, atracurium, atropine, benztropine, buprenorphine, calcium gluconate, CARBOplatin, caspofungin, chlorproMAZINE, cimetidine, CISplatin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, diltiazem, gatifloxacin, zidovudine

SIDE EFFECTS

CNS: Disorientation, hallucinations, *dizziness,* confusion, drowsiness
CV: Hypotension, ventricular tachycardia, QT prolongation, dysrhythmias
GI: *Nausea, vomiting, anorexia;* increased AST, ALT; acute pancreatitis, metallic taste
GU: Acute renal failure, increased serum creatinine, renal toxicity, decreased urination
HEMA: Anemia, leukopenia, thrombocytopenia
INTEG: Sterile abscess, pain at inj site, pruritus, urticaria, *rash*
META: *Hyperkalemia,* hypocalcemia, hypoglycemia, hypomagnesemia
MISC: Fatigue, fever, chills, night sweats, anaphylaxis, Stevens-Johnson syndrome
RESP: Cough, SOB, bronchospasm (with aerosol), sore throat

P

PHARMACOKINETICS

IV: Peak 1 hr
IM: Peak 30 min
Excreted unchanged in urine (66%); half-life 9-12 hr (IM), 6 hr (IV)

INTERACTIONS

• Nephrotoxicity: aminoglycosides, amphotericin B, CISplatin, NSAIDs, vancomycin
⚠ Fatal dysrhythmias: erythromycin IV
Increase: QT prolongation—class IA/III antidysrhythmics, some phenothiazines, β-agonists, local anesthetics, tricyclics, haloperidol, chloroquine, droperidol, pentamidine; CYP3A4 inhibitors (amiodarone, clarithromycin, erythromycin, telithromycin, troleandomycin, arsenic trioxide, levomethadyl); CYP3A4 substrates (methadone, pimozide, QUEtiapine, quiNIDine, risperiDONE, ziprasidone)
Increase: myelosuppression—antineoplastics, radiation
Drug/Lab Test
Decrease: WBC, platelets, Hbg, Hct
Increase: BUN, creatitine

NURSING CONSIDERATIONS

Assess:
• Blood tests, blood glucose, CBC, platelets, calcium, magnesium
• I&O ratio; report hematuria, oliguria
• ECG for cardiac dysrhythmias; patient should be lying down when receiving product; severe hypotension may develop; monitor B/P during administration and until B/P stable
• Hepatic studies: AST, ALT
• Renal studies: urinalysis, BUN, creatinine; nephrotoxicity may occur; any patient with compromised renal system; product is excreted slowly with poor renal system function; toxicity may occur rapidly
• Signs of infection, anemia
• Bowel pattern before, during treatment
• Sterile abscess, pain at inj site
• Respiratory status: rate, character, wheezing, dyspnea
• Dizziness, confusion, hallucination
• Allergies before treatment, reaction of each medication; place allergies on chart in bright red letters; notify all people giving products
• Diabetic patients, hypoglycemia may occur, then hyperglycemia with prolonged therapy
Perform/provide:
• Storage in refrigerator protected from light
Evaluate:
• Therapeutic response: resolution of AIDS-related PCP
Teach patient/family:
• To report sore throat, fever, fatigue (may indicate superinfection)
• To maintain adequate fluid intake

⚠ HIGH ALERT

pentazocine (Rx)

(pen-taz'oh-seen)
Talwin, Talwin NX
Func. class.: Opiate analgesic, antagonist
Chem. class.: Synthetic benzomorphan

Controlled Substance Schedule IV

ACTION: Inhibits ascending pain pathways in CNS, increases pain threshold, alters pain perception

USES: Moderate to severe pain

CONTRAINDICATIONS: Hypersensitivity to this product or sulfites; addiction (opiate)
Precautions: Pregnancy (C), breastfeeding, children <18 yr, addictive personality, increased intracranial pressure, MI (acute), severe heart disease, respiratory depression, renal/hepatic disease, seizure disorder, head trauma, bowel impaction, geriatric patients

DOSAGE AND ROUTES

• **Adult: IV/IM/SUBCUT** 30 mg q3-4hr prn, max 360 mg/day

Labor

• **Adult: IM** 30 mg as a single dose; **IV** 20 mg q2-3hr when contractions are regular, max 2-3 times

Renal dose

• **Adult:** CCr 10-50 ml/min, reduce dose by 25%; CCr <10 ml/min, reduce dose by 50%

Available forms: Inj 30 mg/ml

Administer:

• With antiemetic if nausea, vomiting occur

• When pain is beginning to return; determine dosage interval by patient response

IM/SUBCUT route

• Give IM deeply into large muscle mass, rotate sites; SUBCUT may cause necrosis with repeated inj

Direct IV route

• Undiluted or diluted in 5 mg/ml of sterile water for inj; give ≤5 mg over 1 min

Syringe compatibilities: Atropine, benzquinamide, butorphanol, chlorproMAZINE, cimetidine, dimenhyDRINATE, diphenhydrAMINE, droperidol, fentaNYL, HYDROmorphone, hydrOXYzine, meperidine, metoclopramide, morphine, perphenazine, prochlorperazine, promazine, promethazine, ranitidine, scopolamine

Y-site compatibilities: Heparin, hydrocortisone, potassium chloride, vit B/C

SIDE EFFECTS

CNS: *Drowsiness, dizziness, confusion, headache, sedation, euphoria,* hallucinations, dreaming, insomnia, lightheadedness

CV: Palpitations, bradycardia, change in B/P, tachycardia, increased B/P (high doses), hypotension, syncope, flushing

EENT: Tinnitus, blurred vision, miosis, diplopia

GI: *Nausea,* vomiting, anorexia, constipation, *cramps,* dry mouth

GU: Increased urinary output, dysuria, urinary retention

HEMA: Eosinophilia, decreased WBC

INTEG: *Rash,* urticaria, bruising, flushing, diaphoresis, pruritus, severe irritation at inj sites, Stevens-Johnson syndrome

RESP: Respiratory depression

PHARMACOKINETICS

Metabolized by liver, excreted by kidneys, crosses placenta, half-life 2-3 hr, extensive first-pass metabolism with <20% entering circulation

IM/SUBCUT: Onset 15-30 min, peak 1-2 hr, duration 2-4 hr

IV: Onset 2-3 min, duration 4-6 hr

INTERACTIONS

⚠ Unpredictable reactions: MAOIs

Increase: effects—CNS depressants; alcohol, sedative/hypnotics, antipsychotics, skeletal muscle relaxants

Decrease: effects—opiates

Drug/Lab Test

Increase: amylase

NURSING CONSIDERATIONS

Assess:

• **Pain:** intensity, duration, location prior to and 1 hr after SUBCUT/IM dose or 30 min after IV dose

• I&O ratio; check for decreasing output; may indicate urinary retention

• Bowel status: constipation; may need stimulant laxatives/stool softeners

• **Withdrawal symptoms** in opiate-dependent patients

• Abscesses, ulcerations, WBC count

• CNS changes: dizziness, drowsiness, hallucinations, euphoria, LOC, pupil reaction

• Allergic reactions: rash, urticaria

• **Respiratory depression:** character, rate, rhythm; notify prescriber if respirations are <10/min

• Need for pain medication, physical dependence

P

PHARMACOKINETICS

IV: Peak 1 hr
IM: Peak 30 min
Excreted unchanged in urine (66%); half-life 9-12 hr (IM), 6 hr (IV)

INTERACTIONS

• Nephrotoxicity: aminoglycosides, amphotericin B, CISplatin, NSAIDs, vancomycin
⚠ Fatal dysrhythmias: erythromycin IV
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Teach patient/family:
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Y-site compatibilities: Heparin, hydrocortisone, potassium chloride, vit B/C

SIDE EFFECTS

CNS: *Drowsiness, dizziness, confusion, headache, sedation, euphoria,* hallucinations, dreaming, insomnia, lightheadedness

CV: Palpitations, bradycardia, change in B/P, tachycardia, increased B/P (high doses), hypotension, syncope, flushing

EENT: Tinnitus, blurred vision, miosis, diplopia

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GU: Increased urinary output, dysuria, urinary retention

HEMA: Eosinophilia, decreased WBC

INTEG: *Rash,* urticaria, bruising, flushing, diaphoresis, pruritus, severe irritation at inj sites, Stevens-Johnson syndrome

RESP: Respiratory depression

PHARMACOKINETICS

Metabolized by liver, excreted by kidneys, crosses placenta, half-life 2-3 hr, extensive first-pass metabolism with <20% entering circulation

IM/SUBCUT: Onset 15-30 min, peak 1-2 hr, duration 2-4 hr

IV: Onset 2-3 min, duration 4-6 hr

INTERACTIONS

⚠ Unpredictable reactions: MAOIs

Increase: effects—CNS depressants; alcohol, sedative/hypnotics, antipsychotics, skeletal muscle relaxants

Decrease: effects—opiates

Drug/Lab Test

Increase: amylase

NURSING CONSIDERATIONS

Assess:

• **Pain:** intensity, duration, location prior to and 1 hr after SUBCUT/IM dose or 30 min after IV dose

• I&O ratio; check for decreasing output; may indicate urinary retention

• Bowel status: constipation; may need stimulant laxatives/stool softeners

• **Withdrawal symptoms** in opiate-dependent patients

• Abscesses, ulcerations, WBC count

• CNS changes: dizziness, drowsiness, hallucinations, euphoria, LOC, pupil reaction

• Allergic reactions: rash, urticaria

• **Respiratory depression:** character, rate, rhythm; notify prescriber if respirations are <10/min

• Need for pain medication, physical dependence

Perform/provide:
- Storage in light-resistant area at room temp
- Assistance with ambulation
- Safety measures: nightlight, call bell within easy reach

Evaluate:
- Therapeutic response: decrease in pain

Teach patient/family:
- To report any symptoms of CNS changes, allergic reactions
- That physical dependency may result from extended use
- That withdrawal symptoms may occur: nausea, vomiting, cramps, fever, faintness, anorexia
- To avoid CNS depressants, alcohol
- To avoid driving, operating machinery if drowsiness occurs
- To use good oral hygiene, frequent rinsing of mouth to decrease dry mouth; to avoid gum, candy if drowsy

TREATMENT OF OVERDOSE:
Naloxone (Narcan) 0.2-0.8 mg IV, O_2, IV fluids, vasopressors

pentoxifylline (Rx)
(pen-tox'ih-fill-in)

Trental

Func. class.: Hemorheologic agent

Chem. class.: Dimethylxanthine derivative

ACTION:
Decreases blood viscosity, stimulates prostacyclin formation, increases blood flow by increasing flexibility of RBCs; decreases RBC hyperaggregation; reduces platelet aggregation, decreases fibrinogen concentration

USES:
Intermittent claudication related to chronic occlusive vascular disease

Unlabeled uses: Behçet's syndrome, Kawasaki disease to reduce coronary artery lesions, diabetic neuropathies, sickle cell anemia

CONTRAINDICATIONS:
Hypersensitivity to this product or xanthines, retinal/cerebral hemorrhage

Precautions: Pregnancy (C), breastfeeding, children, angina pectoris, impaired renal function, recent surgery, peptic ulceration, cardiac disease, bleeding disorders

DOSAGE AND ROUTES
- **Adult: PO** 400 mg tid with meals, may decrease to bid if side effects occur; must be taken for ≥8 wk for maximal effect

Behçet's syndrome (unlabeled)
- **Adult: PO** 300 mg bid × 2 wk then 300 mg/day

Acute claudication in sickle cell disease/diabetic neuropathy (unlabeled)
- **Adult: PO** 400 mg tid

Kawasaki disease (unlabeled)
- **Child: PO** 20 mg/kg/day in 3 divided doses with aspirin and IVIG

Available forms: Cont rel tabs 400 mg; ext rel tabs 400 mg

Administer:
- Do not break, crush, or chew ext rel tabs
- With meals to prevent GI upset

SIDE EFFECTS
CNS: *Headache,* anxiety, *tremors,* confusion, *dizziness*

GI: *Dyspepsia, nausea, vomiting*

PHARMACOKINETICS
PO: Peak 2-4 hr, half-life $^1/_2$-1 hr, degradation in liver, excreted in urine

INTERACTIONS
Increase: bleeding risk—warfarin, abciximab, eptifibatide, tirofiban, ticlopidine, clopidogrel, thrombin inhibitor

Increase: theophylline level—theophylline

Increase: hypotension—antihypertensives, nitrates

Increase: pentoxifylline—cimetidine, ciprofloxacin

NURSING CONSIDERATIONS

Assess:
- B/P, respirations of patient also taking antihypertensives; intermittent claudication at baseline and throughout
- PT, Hgb, Hct in patients at risk for hemorrhage
- Serum creatinine/BUN

Evaluate:
- Therapeutic response: decreased pain, cramping, increased ambulation

Teach patient/family:
- That therapeutic response may take 2-4 wk, 8-12 wk to reach full benefit
- To observe feet for arterial insufficiency
- To wear cotton socks, well-fitted shoes; not to go barefoot
- To watch for bleeding, bruises, petechiae, epistaxis
- To avoid smoking to prevent blood vessel constriction
- That there are many drug, herb interactions

perindopril (Rx)

(per-in'doe-pril)

Aceon, Coversye ✤

Func. class.: Antihypertensive

Chem. class.: Angiotensin-converting enzyme inhibitor

ACTION: Selectively suppresses the renin-angiotensin-aldosterone system; inhibits ACE; prevents the conversion of angiotensin I to angiotensin II and the dilation of arterial and venous vessels

USES: Hypertension, stable coronary artery disease

Unlabeled uses: Heart failure

CONTRAINDICATIONS: Hypersensitivity, history of angioedema

Black Box Warning: Pregnancy (D)

Precautions: Breastfeeding, renal disease, hyperkalemia, hepatic failure, dehydration, bilateral renal artery stenosis, cough, angioedema, severe CHF

DOSAGE AND ROUTES

Hypertension
- **Adult: PO** 4 mg/day, may increase or decrease to desired response, range 4-8 mg/day; may give in 2 divided doses or as single dose, max 16 mg/day

Patients on diuretics
- **Adult: PO** 2-4 mg/day in 1-2 divided doses, range 4-8 mg/day

Stable CAD
- **Adult: PO** 4 mg/day × 2 wk then increase as tolerated to 8 mg/day

Renal dose
- **Adult: PO** CCr 16-29 ml/min, 2 mg every other day; CCr 30-59 ml/min, 2 mg/day

Available forms: Tabs scored 2, 4, 8 mg

Administer:
- As single dose or in 2 divided doses, without regard to meals

SIDE EFFECTS

CNS: *Insomnia, dizziness,* paresthesias, headache, fatigue, anxiety, depression
CV: *Hypotension,* chest pain, tachycardia, dysrhythmias, syncope
EENT: *Tinnitus;* visual changes; sore throat; double vision; dry, burning eyes
GI: Nausea, vomiting, colitis, cramps, diarrhea, constipation, flatulence, dry mouth, loss of taste
GU: Proteinuria, renal failure, increased frequency of polyuria or oliguria
HEMA: Agranulocytosis, neutropenia
INTEG: Rash, purpura, alopecia, hyperhidrosis
META: Hyperkalemia
RESP: Dyspnea, *dry cough,* crackles
SYST: Angioedema

PHARMACOKINETICS

Bioavailability 75%; peak 1 hr parent product, 3-7 hr prodrug; protein binding 68%; metabolized by liver (active metabolite perindoprilat); half-life 0.8-10 hr; excreted in urine

INTERACTIONS

Increase: effects of neuromuscular blocking agents, antihypertensives, lithium
Increase: antihypertensive effect—diuretics, NSAIDs
Increase: hypersensitivity—allopurinol
Increase: severe hypotension—diuretics, other antihypertensives
Increase: hyperkalemia—salt substitutes, potassium-sparing diuretics, potassium supplements
Decrease: effects of NSAIDs
Decrease: antihypertensive effect—NSAIDs, salicylates
Drug/Herb
Increase: antihypertensive effect—hawthorn
Decrease: antihypertensive effect—ephedra
Drug/Lab Test
Interference: glucose/insulin tolerance tests

NURSING CONSIDERATIONS

Assess:
- **Hypertension:** B/P, pulse q4hr; note rate, rhythm, quality
- Electrolytes: K, Na, Cl during 1st 2 wk of therapy
- Baselines of renal, hepatic studies before therapy begins, 1 wk into therapy
- Skin turgor, dryness of mucous membranes for hydration status, dry mouth
- **CHF:** edema, dyspnea, wet crackles
- **Angioedema:** facial swelling, urticaria; product should be discontinued, may be more common in African Americans

Evaluate:
- Therapeutic response: decreased B/P

Teach patient/family:
- Not to use OTC (cough, cold, allergy) products unless directed by prescriber; to avoid salt substitutes
- To avoid sunlight or to wear sunscreen for photosensitivity
- To comply with dosage schedule, even if feeling better
- To notify prescriber of mouth sores, sore throat, fever, swelling of hands or feet, irregular heartbeat, chest pains signs of angioedema
- That excessive perspiration, dehydration, vomiting, diarrhea may lead to fall in B/P; to consult prescriber if these occur
- That product may cause dizziness, fainting; that lightheadedness may occur during 1st few days of therapy
- That product may cause skin rash or impaired perspiration; that angioedema may occur and to discontinue product if it occurs
- Not to discontinue product abruptly
- To rise slowly to sitting or standing position to minimize orthostatic hypotension

Black Box Warning: To notify prescriber if pregnancy is planned or suspected; pregnancy category (D)

TREATMENT OF OVERDOSE:

Lavage, IV atropine for bradycardia, IV theophylline for bronchospasm, digoxin, O_2, diuretic for cardiac failure

⚠ HIGH ALERT

PHENobarbital (Rx)

(fee-noe-bar'bi-tal)
Func. class.: Anticonvulsant
Chem. class.: Barbiturate

Controlled Substance Schedule IV

Do not confuse:
PHENobarbital/PENTobarbital

ACTION:

Decreases impulse transmission; increases seizure threshold at cerebral cortex level

USES:

All forms of epilepsy, status epilepticus, febrile seizures in children, sedation, insomnia
Unlabeled uses: Neonatal hyperbilirubinemia, chronic cholestasis, neonatal abstinence syndrome, febrile seizures in children

CONTRAINDICATIONS:

Pregnancy (D), breastfeeding, geriatric patients, hypersensitivity to barbiturates, porphyria, hepatic/respiratory disease, nephritis, hyperthyroidism, diabetes mellitus

Precautions: Anemia, renal disease

DOSAGE AND ROUTES

Seizures

- **Adult: PO** 1-3 mg/kg/day in divided doses bid-tid or total dose at bedtime
- **Child 5-12 yr: PO** 3-6 mg/kg/day in 1-2 divided doses
- **Child 1-5 yr: PO** 6-8 mg/kg/day in 1-2 divided doses
- **Infant: PO** 5-6 mg/kg/day in 1-2 divided doses
- **Neonate: PO** 3-4 mg/kg/day as single dose

Status epilepticus

- **Adult: IV INF** 10 mg/kg; run no faster than 50 mg/min; may give up to 30 mg/kg
- **Child: IV INF** 5-10 mg/kg; may repeat q10-15min up to 20 mg/kg; run no faster than 50 mg/min

Insomnia

- **Adult: PO/IM/SUBCUT** 100-200 mg
- **Child (unlabeled): PO/IM/SUBCUT** 3-5 mg/kg

Sedation

- **Adult: PO/IM** 30-120 mg/day in 2-3 divided doses
- **Child: PO** 6 mg/kg/day in 3 divided doses

Preoperative sedation

- **Adult: IM** 100-200 mg 1-1½ hr before surgery
- **Child: PO/IM/IV** 1-3 mg/kg 1-1½ hr before surgery

Available forms: Caps 15 mg; elix 20 mg/5 ml; tabs 15, 30, 32, 60, 65, 100 mg; inj 30, 60, 65, 130 mg/ml

Administer:

PO route

- Tabs may be crushed and mixed with food or fluids
- **Oral sol:** use undiluted or mixed with water or other fluids; use calibrated measuring device

IM route

- IM inj deep in large muscle mass to prevent tissue sloughing; use <5 ml at each site

IV route

- Reconstitute powder for IV with ≥3 ml sterile water for inj; slow IV after dilution with ≥10 ml sterile water for inj regardless of dose; give ≤50 mg/min; titrate to patient response

Y-site compatibilities: Doxapram, enalaprilat, fentaNYL, fosphenytoin, levofloxacin, linezolid, meropenem, methadone, morphine, propofol, SUFentanil

SIDE EFFECTS

CNS: Paradoxic excitement (geriatric patients), drowsiness, lethargy, hangover headache, flushing, hallucinations, coma

GI: Nausea, vomiting, diarrhea, constipation

HEMA: Agranulocytosis, megaloblastic anemia, thrombocytopenia, thrombophlebitis

INTEG: Rash, urticaria, Stevens-Johnson syndrome, angioedema, local pain, swelling, necrosis, scaling eczema

PHARMACOKINETICS

Metabolized by liver; crosses placenta; excreted in urine, breast milk; half-life 53-118 hr

PO: Onset 20-60 min, duration 6-10 hr

IM/SUBCUT: Onset 10-30 min, duration 4-6 hr

IV: Onset 5 min, peak 30 min, duration 4-6 hr

INTERACTIONS

Increase: effects—CNS depressants, alcohol, chloramphenicol, valproic acid, disulfiram, nondepolarizing skeletal muscle relaxants, sulfonamides, MAOIs

Increase: orthostatic hypotension—furosemide

Decrease: effects—theophylline, oral anticoagulants, corticosteroids, metroNIDAZOLE, doxycycline, quiNIDine, estrogens, hormonal contraceptives

Drug/Herb
Increase: CNS depression—chamomile, eucalyptus, hops, kava, valerian
Decrease: barbiturate effect—St. John's wort

NURSING CONSIDERATIONS

Assess:
- Mental status: mood, sensorium, affect, memory (long, short)
- **Blood dyscrasias:** fever, sore throat, bruising, rash, jaundice
- **Seizures:** type, duration, precipitating factors
- Blood studies, LFTs during long-term treatment
- Therapeutic blood level periodically: 15-40 mcg/ml
- Respiratory status: rate, rhythm, depth, respiratory depression; have emergency equipment nearby
- **Dependence:** physical or psychological, monitor amount given to patient; if patient suicidal, may save medication for attempt
- **Pain:** use pain scale if product used for pain; product may increase pain level

Perform/provide:
- Supervision of ambulation because dizziness, drowsiness may occur

Evaluate:
- Therapeutic response: decreased seizures, increased sedation, adequate sleep

Teach patient/family:
- To use exactly as ordered
- To avoid alcohol, other CNS depressants
- To avoid hazardous activities until patient stabilized on product because drowsiness may occur
- Never to withdraw product abruptly because withdrawal symptoms may occur
- That therapeutic effects (PO) may not be seen for 2-3 wk
- To use additional nonhormonal contraception during treatment; to notify prescriber if pregnancy (D) is planned or suspected

phentolamine (Rx)

(fen-tole'a-meen)
Func. class.: Antihypertensive
Chem. class.: α-Adrenergic blocker

Do not confuse: phentolamine/phentermine

ACTION: α-Adrenergic blocker, binds to α-adrenergic receptors, dilating peripheral blood vessels, lowering peripheral resistances, lowering blood pressure

USES: Hypertension; pheochromocytoma; prevention/treatment of dermal necrosis following extravasation of norepinephrine, DOPamine, EPINEPHrine
Unlabeled uses: Impotence, hypertensive crisis due to MAOIs, sympathomimetic amines, heart failure

CONTRAINDICATIONS: Hypersensitivity, MI, coronary insufficiency, angina
Precautions: Pregnancy (C), breastfeeding, dysrhythmia

DOSAGE AND ROUTES

Treatment of hypertensive episodes in pheochromocytoma
- **Adult: IM/IV** 5 mg, repeat if necessary
- **Child: IV** 0.05-0.1 mg/kg/dose, repeat if necessary; max 5 mg

Diagnosis of pheochromocytoma
- **Adult: IV** 2.5 mg; if negative, repeat with 5 mg IV
- **Child: IV** 0.05 mg/kg; if negative, repeat with 0.1 mg/kg IV

Treatment of necrosis
- **Adult:** 5-10 mg/10 ml **NS** injected into area of norepinephrine extravasation within 12 hr
- **Child:** 0.1-0.2 mg/kg, max 5 mg

Prevention of necrosis
- **Adult:** 10 mg/L of norepinephrine-containing sol
- **Child: IV** 0.1-0.2 mg/kg, max 5 mg

Left ventricular heart failure (unlabeled)
• **Adult: IV** 0.17-0.4 mg/min
Erectile dysfunction (unlabeled)
• **Adult: PO** 40-80 mg
Hypertensive emergency due to MAOIs, sympathomimetic amines (unlabeled)
• **Adult: IV BOL** 5-15 mg
Available forms: Inj 5 mg/ml
Administer:
• Gum, frequent rinsing of mouth, or hard candy for dry mouth
• With vasopressor available
• After discontinuing all medication for 24 hr
• Treatment during required bed rest, 1 hr after
IV route
• After diluting 5 mg/1 ml sterile H_2O for inj; give 5 mg or less/min; patient to remain recumbent during administration
Continuous IV INF route
• Dilute 5-10 mg/500 ml D_5W, titrate to patient response
• 10 mg/L may be added to norepinephrine in IV sol for prevention of dermal necrosis

Additive compatibilities: DOBUTamine, verapamil
Syringe compatibilities: Papaverine
Y-site compatibilities: Amiodarone

SIDE EFFECTS

CNS: *Dizziness,* flushing, weakness, cerebrovascular spasm
CV: *Hypotension, tachycardia, angina, dysrhythmias,* MI
EENT: Nasal congestion
GI: *Dry mouth, nausea, vomiting, diarrhea, abdominal pain*

PHARMACOKINETICS

Metabolized in liver, excreted in urine
IM: Peak 15-20 min, duration 3-4 hr
IV: Peak 2 min, duration 10-15 min

INTERACTIONS

Increase: effects of EPINEPHrine, antihypertensives

Drug/Herb
Increase: toxicity, death—aconite
Increase: antihypertensive effect— barberry, betony, black catechu, black cohosh, bloodroot, broom, burdock, cat's claw, dandelion, goldenseal, hawthorn, Irish moss, Jamaican dogwood, kelp, khella, mistletoe, parsley
Increase or decrease: antihypertensive effect—astragalus, cola tree
Decrease: antihypertensive effect—coltsfoot, guarana, khat, licorice, yohimbe

NURSING CONSIDERATIONS

Assess:
• Weight daily, I&O
• B/P lying, standing before starting treatment, q4hr after
• Nausea, vomiting, diarrhea, edema in feet, legs daily; skin turgor, dryness of mucous membranes for hydration status, postural hypotension, cardiac system: pulse, ECG
Evaluate:
• Therapeutic response: decreased B/P
Teach patient/family:
• That bed rest is required during treatment, 1 hr after

TREATMENT OF OVERDOSE:

Administer norepinephrine; discontinue product

P

phenylephrine (Rx)

(fen-ill-ef'rin)
Neo-Synephrine
Func. class.: Adrenergic, directacting
Chem. class.: Substituted phenylethylamine

ACTION: Powerful and selective (α_1) receptor agonist that causes the contraction of blood vessels

USES: Hypotension, paroxysmal supraventricular tachycardia, shock; maintain B/P for spinal anesthesia

CONTRAINDICATIONS:

Hypersensitivity, ventricular fibrillation, tachydysrhythmias, pheochromocytoma, closed-angle glaucoma, severe hypertension

Precautions: Pregnancy (C), breastfeeding, geriatric patients, arterial embolism, peripheral vascular disease, hyperthyroidism, bradycardia, myocardial disease, severe arteriosclerosis, partial heart block

Black Box Warning: Cardiac disease, extravasation

DOSAGE AND ROUTES

Hypotension

- **Adult: SUBCUT/IM** 2-5 mg; may repeat q10-15min if needed; do not exceed initial dose; **IV** 0.1-0.5 mg; may repeat q10-15min if needed; do not exceed initial dose
- **Child: IM/SUBCUT** 0.1 mg/kg/dose q1-2hr prn

Supraventricular tachycardia

- **Adult: IV BOL** max 0.5 mg; max single dose 1 mg

Shock

- **Adult: IV INF** 10 mg/500 ml D_5W given 100-180 mcg/min (if 20 gtt/ml inf device) then maintenance of 40-60 mcg/min; use inf device
- **Child: IV BOL** 5-20 mcg/kg/dose q10-15min; **IV INF** 0.1-0.5 mcg/kg/min

Available forms: Inj 1% (10 mg/ml)

Administer:

IV route

- Plasma expanders for hypovolemia
- IV after diluting 1 mg/9 ml sterile water for inj; give dose over $^1/_2$-1 min; may be diluted 10 mg/500 ml of D_5W or NS; titrate to response (normal B/P); check for extravasation, check site for infiltration, use inf pump

Additive compatibilities: Chloramphenicol, DOBUTamine, lidocaine, potassium chloride, sodium bicarbonate

Y-site compatibilities: Amiodarone, amrinone, cisatracurium, famotidine, haloperidol, remifentanil, zidovudine

SIDE EFFECTS

CNS: *Headache, anxiety, tremor, insomnia, dizziness*

CV: *Palpitations, tachycardia, hypertension, ectopic beats, angina,* reflex bradycardia, dysrhythmias

GI: *Nausea, vomiting*

INTEG: Necrosis, tissue sloughing with extravasation, gangrene

SYST: Anaphylaxis

PHARMACOKINETICS

IM/SUBCUT: Onset 10-15 min, duration 45-60 min

IV: Onset immediate, duration 20-30 min

INTERACTIONS

- Dysrhythmias: general anesthetics, digoxin

⚠ Do not use within 2 wk of MAOIs because hypertensive crisis may result

Increase: in B/P—oxytocics

Increase: pressor effect—tricyclics, β-blockers, H_1 antihistamines

Decrease: phenylephrine action—α-blockers

NURSING CONSIDERATIONS

Assess:

- I&O ratio; notify prescriber if output <30 ml/hr
- ECG during administration continuously; if B/P increases, product is decreased
- B/P and pulse q5min after parenteral route
- CVP or PWP during inf if possible
- Paresthesias and coldness of extremities; peripheral blood flow may decrease

Perform/provide:

- Storage of reconstituted sol if refrigerated for ≤24 hr
- Discard discolored sol

Evaluate:

- Therapeutic response: increased B/P with stabilization

Teach patient/family:

- About the reason for administration
- To report pain at inf site or other adverse reactions immediately

TREATMENT OF OVERDOSE:
Administer α-blocker

phenylephrine nasal agent
See Appendix B

phenylephrine ophthalmic
See Appendix B

phenytoin (Rx)
(fen'i-toh-in)

Dilantin, Dilantin Infatabs, Phenytek

Func. class.: Anticonvulsant; antidysrhythmic (IB)

Chem. class.: Hydantoin

ACTION: Inhibits spread of seizure activity in motor cortex by altering ion transport; increases AV conduction

USES: Generalized tonic-clonic seizures; status epilepticus; nonepileptic seizures associated with Reye's syndrome or after head trauma; Bell's palsy, complex partial seizures

Unlabeled uses: Migraines, diabetic neuropathy, neuropathic pain, paroxysmal atrial tachycardia, ventricular tachycardia

CONTRAINDICATIONS: Pregnancy (D), hypersensitivity, psychiatric condition, bradycardia, SA and AV block, Stokes-Adams syndrome, hepatic failure, acute intermittent porphyria

Precautions: Geriatric patients, allergies, renal/hepatic disease, petit mal seizures, hypotension, myocardial insufficiency, Asian patients positive for HLA-B1502

Black Box Warning: IV use

DOSAGE AND ROUTES

Seizures

- **Adult: PO** 15-20 mg/kg (ext rel) in 3-4 divided doses given q2hr or 400 mg then 300 mg q2hr × 2 doses; maintenance 4-7 mg/kg/day; **IV** 15-20 mg/kg, max 25-50 mg/min, then 100 mg q6-8hr
- **Child: PO** 5 mg/kg/day in 2-3 divided doses, maintenance 4-8 mg/kg/day in 2-3 divided doses, max 300 mg/day; **IV** 15-20 mg/kg at 1-3 mg/kg/min

Status epilepticus

- **Adult: IV** 10-15 mg/kg, max 25-50 mg/min, may give 100 mg q6-8hr thereafter
- **Child: IV** 15-20 mg/kg, max in divided doses 1-3 mg/kg/min

Ventricular dysrhythmias

- **Adult: PO** Loading dose 1 g divided over 24 hr then 500 mg/day × 2 days; **IV** 250 mg over 5 min until dysrhythmias subside or until 1 g is given or 100 mg q15min until dysrhythmias subside or until 1 g is given
- **Child: PO** 3-8 mg/kg or 250 mg/m^2/day as single dose or 2 divided doses; **IV** 3-8 mg/kg over several min or 250 mg/m^2/day as single dose or 2 divided doses

Renal/hepatic dose

- Do not use loading dose if CCr <10 ml/min or hepatic failure

Neuropathic pain/diabetic neuropathy (unlabeled)

- **Adult: PO** 300 mg/day in divided doses

Migraine prophylaxis (unlabeled)

- **Adult: PO** 200-400 mg/day

Available forms: Susp 25 mg/5 ml; chewable tabs 50 mg; inj 50 mg/ml; ext rel caps 100, 200, 300 mg; prompt rel caps 100 mg

Administer:

PO route

- Do not interchange chewable product with caps, not equivalent; only ext rel caps to be used for once-a-day dosing
- **Oral susp:** shake well before each dose given via G tube/NG tube; dilute susp prior to administration; flush tube with 20 ml water after dose, hold tube feedings 1 hr before and 1 hr after dose
- Allow 7-10 days between dosage changes

P

• Divided PO doses with or after meals to decrease adverse effects
• 2 hr before or after antacid, enteral feeding

Direct IV route

Black Box Warning: Give undiluted at ≤50 mg/min (adult) 1-3 mg/kg/min (neonates), monitor for CV reactions

Intermittent IV INF route

Black Box Warning: Dilute dose in NS to ≤6.7 mg/ml, complete inf within 1 hr of preparation, use 0.22 or 0.45 micron in-line particulate final filter between IV catheter and tubing, flush IV line or catheter with NS before and after use, give at ≤50 mg/min (adult), 0.5-1 mg/kg/min (child, infant, neonate)

Additive compatibilities: Do not admix
Y-site compatibilities: CISplatin, foscarnet, temocillin

SIDE EFFECTS

CNS: Drowsiness, dizziness, insomnia, paresthesias, depression, suicidal tendencies, aggression, headache, confusion, slurred speech, peripheral neuropathy
CV: Hypotension, ventricular fibrillation
EENT: Nystagmus, diplopia, blurred vision
ENDO: Diabetes insipidus
GI: Nausea, vomiting, constipation, anorexia, weight loss, hepatitis, jaundice, gingival hyperplasia
GU: Nephritis, urine discoloration
HEMA: Agranulocytosis, leukopenia, aplastic anemia, thrombocytopenia, megaloblastic anemia
INTEG: Rash, lupus erythematosus, Stevens-Johnson syndrome, hirsutism, toxic epidermal necrolysis
SYST: Hypocalcemia, purple glove syndrome (IV), DRESS, anaphylaxis

PHARMACOKINETICS

Metabolized by liver, excreted by kidneys, protein binding 90%-95%, half-life 7-42 hr, dose dependent

PO: Onset 2-24 hr, peak $1^1/_2$-$2^1/_2$ hr, duration 6-12 hr
PO-ER: Onset 2-24 hr, peak 4-12 hr, duration 12-36 hr
IV: Onset 1-2 hr, duration 12-24 hr

INTERACTIONS

• Do not use with delavirdine, decreased response, resistance
Increase: phenytoin effect—benzodiazepines, cimetidine, tricyclics, salicylates, valproate, cycloSERINE, diazepam, chloramphenicol, disulfiram, alcohol, amiodarone, sulfonamides, FLUoxetine, gabapentin, H_2 antagonists, azole antifungals, estrogens, succinamides, phenothiazines, methylphenidate, felbamate, trazodone
Decrease: phenytoin effects—alcohol (chronic use), antacids, barbiturates, carBAMazepine, rifampin, calcium (high dose), folic acid

Drug/Food
Enteral tube feeding: may decrease absorption of oral product; do not use enteral feedings 2 hr before or 2 hr after dose

Drug/Lab Test
Increase: glucose, alk phos, GGT
Decrease: dexamethasone, metyrapone test serum, PBI, urinary steroids

NURSING CONSIDERATIONS

Assess:
⚠ **Phenytoin hypersensitivity syndrome** 3-12 wk after start of treatment: rash, temp, lymphadenopathy; may cause hepatotoxicity, renal failure, rhabdomyolysis
⚠ **Serious skin disorders:** for beginning rash that may lead to Stevens-Johnson syndrome or toxic epidermal necrolysis; phenytoin should not be used again; may occur more often among Asian patients with HLA-B 1502
⚠ **Purple glove syndrome** with IV use
• Phenytoin level: toxic level 30-50 mcg/ml, therapeutic level: 7.5-20 mcg/ml; wait ≥1 wk to draw levels

- **Seizures:** duration, type, intensity, precipitating factors; obtain EEG periodically, monitor therapeutic level
- Blood studies: CBC, platelets q2wk until stabilized, then monthly × 12, then q3mo; discontinue product if neutrophils $<1600/mm^3$; renal function: albumin conc; folic acid levels, LFTs
- Mental status: mood, sensorium, affect, memory (long, short), suicidal thoughts/behaviors
- **Respiratory depression:** rate, depth, character
- **Blood dyscrasias:** fever, sore throat, bruising, rash, jaundice

Evaluate:

- Therapeutic response; decrease in severity of seizures, ventricular dysrhythmias

Teach patient/family:

- That, if diabetic, blood glucose should be monitored
- That urine may turn pink
- Not to discontinue product abruptly because seizures may occur
- **Oral hygiene:** about the proper brushing of teeth using a soft toothbrush, flossing to prevent gingival hyperplasia; about the need to see dentist frequently
- To avoid hazardous activities until stabilized on product
- To carry emergency ID stating product use
- That heavy use of alcohol may diminish effect of product; to avoid OTC medications
- Not to change brands or forms once stabilized on therapy because brands may vary
- Not to use antacids within 2 hr of product
- To use nonhormonal contraception; to notify prescriber if pregnancy is planned or suspected, pregnancy (D)
- To notify prescriber of unusual bleeding, bruising, petechiae (bleeding), clay-colored stools, abdominal pain, dark urine, yellowing of skin or eyes (hepatotoxicity); slurred speech, headache, drowsiness

phosphate/biphosphate (OTC)

Fleet Enema, Phospho-Soda

Func. class.: Laxative, saline

ACTION: Increases water absorption in the small intestine by osmotic action; laxative effect occurs by increased peristalsis and water retention

USES: Constipation, bowel or rectal preparation for surgery, exam

CONTRAINDICATIONS: Hypersensitivity, rectal fissures, abdominal pain, nausea, vomiting, appendicitis, acute surgical abdomen, ulcerated hemorrhoids, sodium-restricted diet, renal failure, hyperphosphatemia, hypocalcemia, hypokalemia, hypernatremia, Addison's disease, CHF, ascites, bowel perforation, megacolon, imperforate anus

Black Box Warning: GI obstruction, renal failure

Precautions: Pregnancy (C)

Black Box Warning: Colitis, geriatric hypovolemia, renal disease

P

DOSAGE AND ROUTES

- **Adult: PO** 20-30 ml (Phospho-Soda)
- **Child: PO** 5-15 ml (Phospho-Soda)
- **Adult and child >12 yr: RECT** 1 enema (118 ml)
- **Child 2-12 yr: RECT** ½ enema (59 ml)

Available forms: Enema 7 g phosphate/19 g biphosphate/118 ml; oral sol 18 g phosphate/48 g biphosphate/100 ml

Administer:

- Alone for better absorption; do not take within 1-2 hr of other products

SIDE EFFECTS

CV: Dysrhythmias, cardiac arrest, hypotension, widening QRS complex
GI: *Nausea, cramps,* diarrhea
META: Electrolyte, fluid imbalances

PHARMACOKINETICS

Onset 30 min-3 hr, excreted in feces

NURSING CONSIDERATIONS

Assess:

- **Stools:** color, amount, consistency; bowel pattern, bowel sounds, flatulence, distention, fever, dietary patterns, exercise; cramping, rectal bleeding, nausea, vomiting; if these occur, product should be discontinued
- Blood, urine electrolytes if product used often

Evaluate:

- Therapeutic response: decrease in constipation

Teach patient/family:

- Not to use laxatives for long-term therapy because bowel tone will be lost
- That normal bowel movements do not always occur daily
- Not to use in presence of abdominal pain, nausea, vomiting
- To notify prescriber if constipation unrelieved or if symptoms of electrolyte imbalance occur: muscle cramps, pain, weakness, dizziness, excessive thirst
- To maintain fluid consumption

physostigmine ophthalmic

See Appendix B

phytonadione (Rx)

(fye-toe-na-dye'one)

Mephyton, Vit K

Func. class.: Vit K_1, fat-soluble vitamin

ACTION: Needed for adequate blood clotting (factors II, VII, IX, X)

USES: Vit K malabsorption, hypoprothrombinemia, prevention of hypoprothrombinemia caused by oral anticoagulants, prevention of hemorrhagic disease of the newborn

CONTRAINDICATIONS: Hypersensitivity, severe hepatic disease, last few weeks of pregnancy

Precautions: Pregnancy (C), neonates, hepatic disease

Black Box Warning: IV use

DOSAGE AND ROUTES

Hypoprothrombinemia caused by vit K malabsorption

- **Adult: PO/IM** 2.5-25 mg, may repeat or increase to 50 mg
- **Child: PO** 2.5-5 mg
- **Infant: PO/IM** 2 mg

Prevention of hemorrhagic disease of the newborn

- **Neonate: IM** 0.5-1 mg within 1 hr after birth, repeat after 2-3 wk if required

Hypoprothrombinemia caused by oral anticoagulants

- **Adult and child: PO/SUBCUT/IM** 1-10 mg, may repeat 12-48 hr after **PO** dose or 6-8 hr after **SUBCUT/IM** dose based on INR

Available forms: Tabs 5 mg; inj 10 mg/ml, 1 mg/0.5 ml

Administer:

Intermittent IV INF route

- After diluting with ≥10 ml D_5NS; give max 1 mg/min

⚠ IV only when other routes not possible (deaths have occurred)

Y-site compatibilities: Alfentanil, amikacin, aminophylline, ascorbic acid, atracurium, atropine, azaTHIOprine, aztreonam, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, ceFAZolin, cefonicid, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, ceftAZidime, ceftizoxime, cefTRIAXone, cefuroxime, chloramphenicol, chlorproMAZINE, cimetidine, clindamycin, cyanocobalamin, cycloSPORINE, dexamethasone, digoxin, diphenhydrAMINE, DOPamine, doxycycline, enalaprilat, ePHEDrine, EPINEPHrine, epoetin alfa, erythromycin, esmolol, famotidine, fentaNYL, fluconazole, folic acid, furosemide, ganciclovir, gentamicin, glyco-

pyrrolate, heparin, hydrocortisone, imipenem/cilastatin, indomethacin, insulin, isoproterenol, ketorolac, labetalol, lidocaine, mannitol, meperidine, metaraminol, methoxamine, methyldopate, metoclopramide, metoprolol, metroNIDAZOLE, midazolam, morphine, multivitamins, nafcillin, nalbuphine, naloxone, nitroglycerin, nitroprusside, norepinephrine, ondansetron, oxacillin, oxytocin, papaverine, penicillin G potassium, pentamidine, pentazocine, PENTobarbital, PHENobarbital, phentolamine, phenylephrine, potassium chloride, procainamide, prochlorperazine, propranolol, pyridoxime, ranitidine, sodium bicarbonate, succinylcholine, SUFentanil, theophylline, thiamine, ticarcillin/clavulanate, tobramycin, tolazoline, trimetaphan, urokinase, vancomycin, vasopressin, verapamil, vitamin B with C

SIDE EFFECTS

CNS: Headache, brain damage (large doses)
GI: Nausea, decreased LFTs
HEMA: Hemolytic anemia, hemoglobinuria, hyperbilirubinemia
INTEG: Rash, urticaria
RESP: Bronchospasm, dyspnea, feeling of chest constriction, respiratory arrest

PHARMACOKINETICS

PO/INJ: Metabolized, crosses placenta

INTERACTIONS

Decrease: action of phytonadione—bile acid sequestrants, sucralfate, antiinfectives, salicylates, mineral oil
Decrease: action of warfarin—large dose of product

NURSING CONSIDERATIONS

Assess:
• **Bleeding:** emesis, stools, urine; pressure on all venipuncture sites; avoid all inj if possible
• PT during treatment (2-sec deviation from control time, bleeding time, clotting time); monitor for bleeding, pulse, and B/P

Perform/provide:
• Storage in tight, light-resistant container

Evaluate:
• Therapeutic response: prevention of hemorrhagic disease of the newborn, resolution of hypoprothrombinemia

Teach patient/family:
• Not to take other supplements, OTC products, prescription products unless directed by prescriber
• About the necessary foods for associated diet
• To avoid IM inj; to use soft toothbrush; not to floss, use electric razor until coagulation defect corrected
• To report symptoms of bleeding
• About the importance of frequent lab tests to monitor coagulation factors
• To notify all health care providers of use of this product
• To carry emergency ID describing condition and products used

pilocarpine ophthalmic

See Appendix B

pimecrolimus topical

See Appendix B

pioglitazone (Rx)

(pie-oh-glye'ta-zone)

Actos

Func. class.: Antidiabetic, oral
Chem. class.: Thiazolidinedione

ACTION: Specifically targets insulin resistance; an insulin sensitizer; regulates the transcription of a number of insulin-responsive genes

USES: Type 2 diabetes mellitus

CONTRAINDICATIONS:

Breastfeeding, children, hypersensitivity to thiazolidinedione, diabetic ketoacidosis

Black Box Warning: NYHA Class III/IV heart failure

Precautions: Pregnancy (C), geriatric patients, geriatric patients with CV disease, renal/hepatic/thyroid disease, edema, polycystic ovary syndrome, bladder cancer, osteoporosis, pulmonary disease, secondary malignancy

DOSAGE AND ROUTES

Monotherapy

• **Adult: PO** 15 or 30 mg/day, may increase to 45 mg/day; with strong CYP2C8, max 15 mg/day; with NYHA class I/II heart failure, max 15 mg/day

Combination therapy

• **Adult: PO** 15 or 30 mg/day with a sulfonylurea, metformin, or insulin; decrease sulfonylurea dose if hypoglycemia occurs; decrease insulin dose by 10%-25% if hypoglycemia occurs or if plasma glucose is <100 mg/dl, max 45 mg/day

Hepatic dose

• Do not use in active hepatic disease or if ALT >2.5 times ULN

Available forms: Tabs 15, 30, 45 mg

Administer:

• Once a day; without regard to meals

• Tabs crushed and mixed with food or fluids for patients with difficulty swallowing

SIDE EFFECTS

CNS: *Headache*

CV: MI, heart failure, death (geriatric patients)

ENDO: Hypo/hyperglycemia

MISC: *Sinusitis, upper respiratory tract infection, pharyngitis,* hepatotoxicity, edema, weight gain, anemia, macular edema; risk of bladder cancer (use >1 yr)

MS: Rhabdomyolysis, fractures (females), myalgia

PHARMACOKINETICS

Maximal reduction in FBS after 12 wk; half-life 3-7 hr, terminal 16-24 hr; protein binding >99%

INTERACTIONS

Decrease: effect of atorvastatin

Decrease: effect of oral contraceptives; use alternative contraceptive method

Decrease: pioglitazone effect—CYP2C8 inducers (ketoconazole, fluconazole, itraconazole, miconazole, voriconazole)

Drug/Herb

Increase: hypoglycemia—garlic, green tea, horse chestnut

Drug/Lab Test

Increase: CPK, LFTs, HDL, cholesterol

Decrease: glucose, Hct/Hgb

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Heart failure: do not use in NYHA Class III/IV; excessive/rapid weight gain >5 lb, dyspnea, edema; may need to be reduced or discontinued

• **Bladder cancer:** avoid use in a history of bladder cancer; use of pioglitazone >1 yr has shown an increase in bladder cancer

• **Hypoglycemic reactions:** sweating, weakness, dizziness, anxiety, tremors, hunger; hyperglycemic reactions soon after meals (rare); may occur more often with insulin or other antidiabetics

• **Hepatic disease:** check LFTs periodically: AST, LDH; do not start treatment in active heart disease or if ALT >2.5× upper limit of normal; if treatment has already begun, follow closely with continuing ALT levels; if ALT increases to >3× upper limit of normal, recheck ALT as soon as possible; if ALT remains >3× upper limit of normal, discontinue

• FBS, glycosylated HbA1c, plasma lipids/lipoproteins, B/P, body weight during treatment

• CBC with differential prior to and during therapy; more necessary in those with anemia, Hct/Hgb (may be decreased in first few months of treatment)

Perform/provide:
- Conversion from other oral hypoglycemic agents; change may be made with gradual dosage change; monitor serum glucose during conversion
- Storage in tight container in cool environment

Evaluate:
- Therapeutic response: decrease in polyuria, polydipsia, polyphagia; clear sensorium; absence of dizziness; stable gait; blood glucose A1c improvement

Teach patient/family:
- To self-monitor using a blood glucose meter
- About the symptoms of hypo/hyperglycemia, what to do about each
- That product must be continued on daily basis; about the consequences of discontinuing product abruptly
- To avoid OTC medications or herbal preparations unless approved by prescriber
- That diabetes is a lifelong illness; that product is not a cure, it only controls symptoms
- To notify prescriber if oral contraceptives are used, effect may be decreased; not to use product if breastfeeding
- To report symptoms of hepatic dysfunction: nausea, vomiting, abdominal pain, fatigue, anorexia, dark urine, jaundice
- To report weight gain, edema
- That lab work, eye exams will be needed periodically

piperacillin/tazobactam (Rx)

(pip'er-ah-sill'in/ta-zoe-bak'tam)

Zosyn

Func. class.: Antiinfective, broad spectrum

Chem. class.: Extended-spectrum penicillin, β-lactamase inhibitor

ACTION: Interferes with cell-wall replication of susceptible organisms; osmotically unstable cell wall swells and bursts from osmotic pressure; tazobactam is a β-lactamase inhibitor that protects piperacillin from enzymatic degradation

USES: Moderate to severe infections: piperacillin-resistant, β-lactamase–producing strains causing infections in respiratory, skin, urinary tract, bone, gonorrhea, pneumonia; effective for resistant *Staphylococcus aureus,* resistant *Escherichia coli, Bacteroides fragilis, Bacteroides ovatus, Bacteroides thetaiotaomicron, Bacteroides vulgatus, Haemophilus influenzae*

CONTRAINDICATIONS: Hypersensitivity to penicillins; neonates; carbapenem allergy

Precautions: Pregnancy (B), breastfeeding, renal insufficiency in children, hypersensitivity to cephalosporins, CHF, seizures, GI disease, electrolyte imbalances

DOSAGE AND ROUTES

Nosocomial pneumonia
- **Adult: IV** 4.5 g q6hr or 3.375 g q4hr with an aminoglycoside or antipseudomonal fluoroquinolone × 1-2 wk; continue aminoglycoside only if *Pseudomonas aeruginosa* is isolated

Other infections
- **Adult: IV INF** 6-12 g/day given 2.25 g q8hr to 3.375 g q6hr over 30 min × 7-10 days

Appendicitis/peritonitis
- **Child ≥40 kg (88 lb): IV** 3.375 g q6hr × 7-10 days
- **Child ≥9 mo and <40 kg: IV** 100 mg/kg (piperacillin)/kg q8hr × 7-10 days
- **Infant 2 mo to <9 mo: IV** 80 mg (piperacillin) q8hr × 7-10 days

Renal dose
- **Adult: IV** CCr 20-40 ml/min, give 3.375 g q6hr (nosocomial pneumonia); give 2.25 g q6hr (all other indications); CCr <20 ml/min, give 2.25 g q6hr (nosocomial pneumonia), give 2.25 g q8hr (all other indications)

P

Available forms: Powder for inj 2 g piperacillin/0.25 g tazobactam, 3 g piperacillin/0.375 g tazobactam, 4 g piperacillin/0.5 g tazobactam, 36 g piperacillin/4.5 g tazobactam

Administer:

- Separate aminoglycoside from piperacillin to avoid inactivation
- Product after C&S is complete

Intermittent IV INF route

- Reconstitute each 1 g of product/5 ml 0.9% NaCl for inj or sterile water for inj, dextrose 5%; shake well; further dilute in ≥50 ml compatible IV sol, run as int inf over ≥30 min

Y-site compatibilities: Alfentanil, allopurinol, amifostine, amikacin, aminocaproic acid, aminophylline, amphotericin B lipid complex, amphotericin B liposome, anidulafungin, atenolol, aztreonam, bivalirudin, bleomycin, bumetanide, buprenorphine, busulfan, butorphanol, calcium acetate/chloride/gluconate, CARBOplatin, carmustine, cefepime, chloramphenicol, cimetidine, clindamycin, cyclophosphamide, cyclOSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, dexrazoxane, diazepam, digoxin, diphenhydrAMINE, DOCEtaxel, DOPamine, doxacurium, enalaprilat, ePHEDrine, EPINEPHrine, eptifibatide, erythromycin, esmolol, etoposide, fenoldopam, fentaNYL, floxuridine, fluconazole, fludarabine, fluorouracil, foscarnet, fosphenytoin, furosemide, gallium, granisetron, heparin, hydrocortisone, HYDROmorphone, ifosfamide, isoproterenol, ketorolac, lansoprazole, leucovorin, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, melphalan, meperidine, mesna, metaraminol, methotrexate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, milrinone, morphine, naloxone, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxytocin, PACLitaxel, palonosetron, pamidronate, pancuronium, pantoprazole, PEMEtrexed, PENTobarbital, PHENobarbital, phenylephrine, plicamycin, potassium chloride/phosphates, procainamide, ranitidine, remifentanil, riTUXimab, sargramostim, sodium acetate/bicarbonate/phosphates, succinylcholine, SUFentanil, sulfamethoxazole-trimethoprim, tacrolimus, teniposide, theophylline, thiotepa, tigecycline, tirofiban, trimethobenzamide, vasopressin, vinBLAStine, vinCRIStine, voriconazole, zidovudine, zoledronic acid

SIDE EFFECTS

CNS: Lethargy, hallucinations, anxiety, depression, twitching, insomnia, headache, fever, dizziness, seizures, vertigo

CV: Cardiac toxicity

GI: *Nausea, vomiting, diarrhea;* increased AST, ALT; abdominal pain, glossitis, pseudomembranous colitis, constipation

GU: Oliguria, proteinuria, hematuria, *vaginitis, moniliasis,* glomerulonephritis, renal failure

HEMA: Anemia, increased bleeding time, bone marrow depression, agranulocytosis, hemolytic anemia

INTEG: Rash, pruritus, exfoliative dermatitis

META: Hypokalemia, hypernatremia

SYST: Serum sickness, anaphylaxis, Stevens-Johnson syndrome

PHARMACOKINETICS

Half-life 0.7-1.2 hr; excreted in urine, bile, breast milk; crosses placenta; 33% bound to plasma proteins

IV: Peak completion of IV

INTERACTIONS

Increase: effect of neuromuscular blockers, oral anticoagulants, methotrexate

Increase: piperacillin concentrations—aspirin, probenecid

Decrease: antimicrobial effect of piperacillin—tetracyclines, aminoglycosides IV

Drug/Lab Test

Increase: platelet count, eosinophilia, neutropenia, leukopenia, serum creati-

nine, PTT, AST, ALT, alk phos, bilirubin, BUN, electrolytes
Decrease: Hct, Hgb, electrolytes
False positive: urine glucose, urine protein, Coombs' test

NURSING CONSIDERATIONS

Assess:
- **Infection:** temp, stools, urine, sputum, wounds
- I&O ratio; report hematuria, oliguria because penicillin in high doses is nephrotoxic; maintain hydration unless contraindicated
- Hepatic studies: AST, ALT before treatment and periodically thereafter
- Blood studies: WBC, RBC, Hct, Hgb, bleeding time before treatment and periodically thereafter; serum potassium
- Renal studies: urinalysis, protein, blood, BUN, creatinine before treatment and periodically thereafter
- C&S before product therapy; product may be given as soon as culture is taken
- **Pseudomembranous colitis:** diarrhea, bloody stools, fever, abdominal cramps; may occur ≤2 mo after treatment; bowel pattern before and during treatment
- Skin eruptions after administration of penicillin to 1 wk after discontinuing product
- Respiratory status: rate, character, wheezing, tightness in chest
- **Anaphylaxis:** wheezing, laryngeal edema, rash, itching; discontinue product, have emergency equipment nearby

Perform/provide:
- Adequate intake of fluids (2 L) during diarrhea episodes
- Discard after 24 hr if stored at room temp or after 48 hr if refrigerated; use single-dose vials immediately after reconstitution; stable in ambulatory IV pump for 12 hr

Evaluate:
- Therapeutic response: absence of fever, purulent drainage, redness, inflammation; culture shows decreased organisms

Teach patient/family:
- That culture may be taken after completed course of medication
- To report sore throat, fever, fatigue (superinfection); CNS effects (anxiety, depression, hallucinations, seizures); **pseudomembranous colitis:** fever, diarrhea with blood, pus, mucous
- To wear or carry emergency ID if allergic to penicillins
- To notify nurse of diarrhea

TREATMENT OF OVERDOSE:

Withdraw product, maintain airway, administer EPINEPHrine, aminophylline, O_2, IV corticosteroids for anaphylaxis

pirbuterol (Rx)

(peer-byoo'ter-ole)

Maxair

Func. class.: Bronchodilator
Chem. class.: β-Adrenergic agonist

ACTION: Causes bronchodilation with little effect on heart rate by action on β-receptors, causing increased cAMP and relaxation of smooth muscle

USES: Reversible bronchospasm (prevention, treatment) including asthma; may be given with theophylline or steroids

CONTRAINDICATIONS: Hypersensitivity to sympathomimetics, tachycardia
Precautions: Pregnancy (C), breastfeeding, cardiac disorders, hyperthyroidism, hypertension, diabetes mellitus, prostatic hypertrophy

DOSAGE AND ROUTES

- **Adult and child >12 yr:** INH 1-2 puffs (0.4 mg) q4-6hr; max 12 INH/day

Available forms: Aerosol delivery 0.2 mg pirbuterol/actuation

Administer:
• After shaking; exhale; place mouthpiece in mouth; inhale slowly; hold breath; remove; exhale slowly
• Gum, sips of water for dry mouth

SIDE EFFECTS

CNS: Tremors, anxiety, insomnia, headache, dizziness, stimulation, restlessness, hallucinations, drowsiness, irritability
CV: Palpitations, tachycardia, hypertension, angina, hypotension, dysrhythmias
EENT: Dry nose and mouth, irritation of nose, throat
GI: Gastritis, nausea, vomiting, anorexia
MS: Muscle cramps
RESP: Paradoxical bronchospasm, dyspnea, coughing

PHARMACOKINETICS

INH: Onset 3 min, peak ½-1 hr, duration 5 hr, terminal half-life 2 hr

INTERACTIONS

⚠ Hypertensive crisis: MAOIs
Increase: action of other aerosol bronchodilators
Increase: pirbuterol action—tricyclics, antihistamines, levothyroxine
Decrease: pirbuterol action—β-blockers
Drug/Herb
Increase: action of both—cola nut, guarana, yerba maté
Increase: effect—green tea (large amounts), guarana

NURSING CONSIDERATIONS

Assess:
• Respiratory function: vital capacity, forced expiratory volume, ABGs, B/P, lung sounds, pulse, characteristics of sputum
⚠ Paradoxical bronchospasm, that can occur rapidly, hold product, notify prescribeer
Perform/provide:
• Storage in light-resistant container; do not expose to temperatures over 86° F (30° C)
• Fluid intake >2 L/day to liquefy thick secretions
Evaluate:
• Therapeutic response: absence of dyspnea, wheezing over 1 hr
Teach patient/family:
• Not to use OTC medications; extra stimulation may occur
• Use of inhaler; review package insert with patient
• To avoid getting aerosol in eyes
• Actuator is for Maxair autoinhaler; do not use with other inhaler canister
• About all aspects of product; avoid smoking, smoke-filled rooms, persons with respiratory infections
• To keep fluid intake >2 L/day to liquefy thick secretions

TREATMENT OF OVERDOSE:

Administer a β-adrenergic blocker

pitavastatin (Rx)

(pit'a-va-stat'-in)
Livalo
Func. class.: Antilipidemic
Chem. class.: HMG-CoA reductase inhibitor

Do not confuse:
pitavastatin/pravastatin

ACTION: Inhibits HMG-CoA reductase enzyme, which reduces cholesterol synthesis; high doses lead to plaque regression

USES: As an adjunct for primary hypercholesterolemia (types Ia, Ib), dysbetalipoproteinemia, elevated triglyceride levels, prevention of CV disease by reduction of heart risk in those with mildly elevated cholesterol
Unlabeled Uses: Atherosclerosis

CONTRAINDICATIONS: Pregnancy (X), breastfeeding, hypersensitivity, active hepatic disease, cholestasis
Precautions: Past hepatic disease, alcoholism, severe acute infections, trauma,

severe metabolic disorders, electrolyte imbalance, seizures, surgery, organ transplant, endocrine disease, females, hypotension, renal disease

DOSAGE AND ROUTES

• **Adult: PO** 2 mg/day, usual range 1-4, max 4 mg/day

Renal dose

• **Adult: PO** CCr 30-<60 ml/min, 1 mg daily, max 2 mg daily; CCr <30 ml/min on hemodialysis, 1 mg daily, max 2 mg daily; CCr <30 ml/min, not recommended

Atherosclerosis (unlabeled)

• **Adult: PO** 4 mg/day

Available forms: Tabs 1, 2, 4 mg

Administer:

• Total daily dose any time of day without regard to meals

• Storage in cool environment in tight container protected from light

SIDE EFFECTS

CNS: Headache

GI: Constipation, diarrhea

INTEG: Rash, pruritus, alopecia

MS: Arthralgia, myalgia, rhabdomyolysis

RESP: Pharyngitis

PHARMACOKINETICS

Peak 1 hr; metabolized in liver, excreted in urine, feces; half-life 12 hr; protein binding 99%; concentrations lower in healthy African Americans

INTERACTIONS

Increase: risk for possible rhabdomyolysis—azole antifungals, cycloSPORINE, erythromycin, niacin, gemfibrozil, clofibrate

Increase: levels of pitavastatin—erythromycin

Drug/Herb

Increase: pitavastatin—red yeast rice

Drug/Lab Test

Increase: bilirubin, alk phos, ALT, AST

Interference: thyroid function tests

NURSING CONSIDERATIONS

Assess:

• **Diet;** obtain diet history including fat, cholesterol in diet

• Cholesterol, triglyceride levels periodically during treatment; check lipid panel 6 wk after changing dose

• Hepatic studies at 12 wk after starting treatment, then q6mo; if AST >3× normal, reduce or discontinue; AST, ALT, LFTs may be increased

• Renal studies in patients with compromised renal system: BUN, I&O ratio, creatinine

Rhabdomyolysis: muscle pain, tenderness; obtain CPK baseline; if markedly increased, product may need to be discontinued

Evaluate:

• Therapeutic response: decrease in cholesterol to desired level after 6 wk

Teach patient/family:

• That blood work will be necessary during treatment

• To report blurred vision, severe GI symptoms, headache, muscle pain, weakness, tenderness

• That previously prescribed regimen will continue: low-cholesterol diet, exercise program, smoking cessation

• Not to take product if pregnant (X) or if pregnancy is planned or suspected (notify prescriber); to avoid breastfeeding

P

plasma protein fraction (Rx)

Plasmanate

Func. class.: Hematological agent

Chem. class.: Plasma volume expander

ACTION: Exerts similar oncotic pressure as human plasma, expands blood volume

USES: Hypovolemic shock, hypoproteinemia, ARDS, preoperative cardiopulmonary bypass, acute hepatic failure, nephrotic syndrome, cardiogenic shock

CONTRAINDICATIONS:

Hypersensitivity to this product or albumin; CHF, severe anemia, renal insufficiency, hyponatremia, cardiopulmonary bypass

Precautions: Pregnancy (C), decreased salt intake, decreased cardiac reserve, lack of albumin deficiency, hepatic disease

DOSAGE AND ROUTES

Hypovolemia

- **Adult: IV INF** 250-500 ml (12.5-25 g protein), max 10 ml/min
- **Child: IV INF** 10-30 ml/kg at max 5-10 ml/min

Hypoproteinemia

- **Adult: IV INF** 1000-1500 ml/day, max 8 ml/min

Available forms: Inj 5%

Administer:

IV route

- IV access at distant site from infection or trauma; no dilution required; use inf pump, use large-gauge needle (≥20 G); discard unused portion; infuse slowly to prevent hypotension
- Within 4 hr of opening, discard partially used vials
- Do not use sol that has been frozen
- Adjust rate to changes in B/P

Additive compatibilities: Carbohydrate and electrolyte sol, whole blood, packed RBCs, chloramphenicol, tetracycline

SIDE EFFECTS

CNS: Fever, chills, headache, paresthesias, flushing

CV: Fluid overload, hypotension, erratic pulse

GI: Nausea, vomiting, increased salivation

INTEG: Rash, urticaria, cyanosis

RESP: Altered respirations, dyspnea, PE

PHARMACOKINETICS

Metabolized as a protein/energy source

INTERACTIONS

Drug/Lab Test

False increase: alk phos

NURSING CONSIDERATIONS

Assess:

- Blood studies: Hct, Hgb, electrolytes, serum protein; if serum protein declines, dyspnea, hypoxemia can result
- B/P (decreased), pulse (erratic), respiration during inf
- I&O ratio; urinary output may decrease
- Allergy: fever, rash, itching, chills, flushing, urticaria, nausea, vomiting, hypotension requires discontinuation of inf; use new lot if therapy reinstituted; premedicate with diphenhydrAMINE

⚠ Increased CVP reading: distended neck veins indicate circulatory overload; SOB, anxiety, insomnia, expiratory crackles, frothy blood-tinged cough, cyanosis indicate pulmonary overload

Perform/provide:

- Adequate hydration before administration
- Storage at room temp, max 86° F

Evaluate:

- Therapeutic response: increased B/P, decreased edema, increased serum albumin

plerixafor (Rx)

(pler-ix'a-fore)

Mozobil

Func. class.: Biologic modifier

Chem. class.: Colony-stimulating factor

ACTION: Competitively inhibits the binding of stromal-derived factors, thereby allowing hematopoietic stem cells to mobilize into peripheral blood

USES: For peripheral blood stem cell (PBSC) mobilization for collection and autologous transplant in patients with non-Hodgkin's lymphoma, multiple myeloma; used with a granulocyte colony-stimulating factor (G-CSF)

CONTRAINDICATIONS:
Hypersensitivity, breastfeeding, pregnancy (D)
Precautions: Children, renal disease, thrombocytopenia

DOSAGE AND ROUTES
• **Adult: SUBCUT** 0.24 mg/kg daily about 11 hr prior to initiation of apheresis, give for up to 4 consecutive days; give filgrastim 10 mcg/kg; **SUBCUT** daily each AM beginning 4 days prior to the 1st evening dose of plerixafor and on each day of apheresis; give filgrastim before procedure
Available forms: Inj 300 mcg/ml, 480 mcg/1.6 ml, 480 mcg/0.8 ml, 3000 mcg/0.5 ml
Administer:
SUBCUT route
• Each single-use vial contains 24 mg of plerixafor (1.2 ml of 20 mg/ml sol); volume calculated by multiplying 0.012 by actual body weight (kg)
• Give 11 hr before apheresis
• Max 40 mg/day or 27 mg/day in patients with renal disease

SIDE EFFECTS
CNS: Syncope, dizziness, fatigue, headache, insomnia, malaise, paresthesias
GI: *Nausea,* vomiting, diarrhea, abdominal pain, constipation
HEMA: Thrombocytopenia, leukocytosis
INTEG: Rash, skin irritation, pruritus, inj site reaction, erythema, urticaria
MS: Musculoskeletal pain
RESP: Dyspnea, hypoxia

PHARMACOKINETICS
SUBCUT: 30-60 min, peak mobilization 6-9 hr, 58% protein binding, 70% excreted via kidneys (parent drug), terminal half-life 3-5 hr

INTERACTIONS
Increase: adverse reactions—do not use this product concomitantly with lithium, may increase leukocytosis

NURSING CONSIDERATIONS
Assess:
• Blood studies: CBC, differential
• B/P, respirations, pulse before and during therapy
• Bone pain; give mild analgesics
Perform/provide:
• Storage at room temp
Evaluate:
• Therapeutic response: collection of stem cells
Teach patient/family:
• About reason for use and expected results
• **Pregnancy (D):** notify prescriber if pregnancy is planned or suspected, do not breastfeed

posaconazole (Rx)
(poe'sa-kon'a-zole)
Noxafil, Posanol ✤
Func. class.: Antifungal—systemic
Chem. class.: Triazole derivative

ACTION:
Inhibits a portion of cell-wall synthesis; alters cell membranes and inhibits several fungal enzymes

USES:
Prevention of aspergillus, candida infection, oropharyngeal candidiasis in immunocompromised patients, chemotherapy-induced neutropenia, mucocutaneous, candidiasis
Unlabeled uses: Aspergillosis, cellulitis, coccidioidomycosis, endocarditis, endophthalmitis, esophageal candidiasis, febrile neutropenia, fungal keratitis, fusariosis, histoplasmosis, infectious arthritis, myocarditis, osteomyelitis, pericarditis, sinusitis, tracheobronchitis

CONTRAINDICATIONS:
Hypersensitivity to this product or other systemic antifungals or azoles; fungal meningitis, onchomycosis or dermatomycosis in cardiac dysfunction
Precautions: Pregnancy (C), breastfeeding, children, cardiac/hepatic disease

P

DOSAGE AND ROUTES

• **Adult, adolescent: PO** 800 mg/day in 2-4 divided doses
• **Child: PO** 100 mg tid
Available forms: Oral susp 200 mg/5 ml
Administer:
PO route
• **Oral susp:** shake well; use calibrated measuring device; take only with full meal or liquid nutritional supplements such as Ensure; rinse measuring device after each use

SIDE EFFECTS

CNS: *Headache, dizziness,* insomnia, fever, rigors, weakness, anxiety
CV: Hypo/hypertension, tachycardia, anemia
GI: *Nausea, vomiting, anorexia, diarrhea,* cramps, abdominal pain, flatulence, GI bleeding, hepatotoxicity
GU: Gynecomastia, impotence, decreased libido
INTEG: *Pruritus,* fever, *rash,* toxic epidermal necrolysis
MISC: *Edema, fatigue,* malaise, hypokalemia, tinnitus, rhabdomyolysis

PHARMACOKINETICS

Well absorbed, enhanced by food, protein binding 98%-99%, peak 3-5 hr, half-life 35 hr, metabolized in liver, excreted in feces (77% unchanged)

INTERACTIONS

• Do not use with lovastatin, atorvastatin
Increase: QT prolongation—class IA/III antidysrhythmics, some phenothiazines, β agonists, local anesthetics, tricyclics, haloperidol, chloroquine, droperidol, pentamidine; CYP3A4 inhibitors (amiodarone, clarithromycin, erythromycin, telithromycin, troleandomycin), arsenic trioxide, levomethadyl; CYP3A4 substrates (methadone, pimozide, QUEtiapine, quiNIDine, risperiDONE, ziprasidone)
Increase: tinnitus, hearing loss—quiNIDine
Increase: hepatotoxicity—other hepatotoxic products
Increase: severe hypoglycemia—oral hypoglycemics
Increase: sedation—triazolam, oral midazolam
Increase: levels, toxicity—busPIRone, busulfan, calcium-channel blockers, clarithromycin, cycloSPORINE, diazepam, digoxin, felodipine, HMG-CoA reductase inhibitors, indinavir, isradipine, midazolam, niCARdipine, NIFEdipine, niMODipine, phenytoin, quiNIDine, ritonavir, saquinavir, sirolimus, tacrolimus, vinca alkaloids, warfarin
Decrease: posaconazole level—cimetidine, phenytoin
Decrease: posaconazole action—antacids, H_2-receptor antagonists, rifamycin, didanosine
Drug/Food
• Food increases absorption

NURSING CONSIDERATIONS

Assess:
Infection: type of, may begin treatment prior to obtaining results; temp, WBC, sputum at baseline and periodically, break-through infections may occur when used with fosamprenavir
• I&O ratio, electrolytes; correct electrolyte imbalances before starting treatment
• For allergic reaction: rash, photosensitivity, urticaria, dermatitis
Rhabdomyolysis: muscle pain, increased CPK; weakness, swelling of affected muscles; if these occur and if confirmed by CPK, product should be discontinued
Hepatotoxicity: nausea, vomiting, jaundice, clay-colored stools, fatigue; hepatic studies (ALT, AST, bilirubin) if patient receiving long-term therapy
QT prolongation: ECG for QT prolongation, ejection fraction; assess for chest pain, palpitations, dyspnea
Perform/provide:
• Storage in tight container in refrigerator; do not freeze

Evaluate:
- Therapeutic response: decreased symptoms of fungal infection, negative C&S for infecting organism

Teach patient/family:
- That long-term therapy may be needed to clear infection (1 wk-6 mo, depending on infection)
- To avoid hazardous activities if dizziness occurs
- To take 2 hr before administration of other products that increase gastric pH (antacids, H_2-blockers, omeprazole, sucralfate, anticholinergics); to notify health care provider of all medications taken
- About the importance of compliance with product regimen; to use alternative method of contraception
- To notify prescriber of GI symptoms, signs of hepatic dysfunction (fatigue, nausea, anorexia, vomiting, dark urine, pale stools)

potassium acetate
potassium bicarbonate (OTC, Rx)
K Effervescent, Klor-Con EF, K-Vescent

potassium bicarbonate and potassium chloride (OTC, Rx)
Neo-K ✤

potassium bicarbonate and potassium citrate (OTC, Rx)

potassium chloride (OTC, Rx)
Epiklor, Klor-Con, K-Tab, Micro-K, Odan K-20 ✤

potassium gluconate (OTC, Rx)
Equaline Potassium Gluconate, Walgreens Finest Natural Potassium Gluconate

Func. class.: Electrolyte, mineral replacement

Chem. class.: Potassium

P

ACTION: Needed for the adequate transmission of nerve impulses and cardiac contraction, renal function, intracellular ion maintenance

USES: Prevention and treatment of hypokalemia

CONTRAINDICATIONS: Renal disease (severe), severe hemolytic disease, Addison's disease, hyperkalemia, acute dehydration, extensive tissue breakdown

Precautions: Pregnancy (C), cardiac disease, potassium-sparing diuretic therapy, systemic acidosis

DOSAGE AND ROUTES

Hypokalemia (prevention) (bicarbonate, chloride, gluconate)

• **Adult: PO** 20 mEq/day in 1-2 divided doses

• **Child: PO** 1-2 mEq/kg/day in 1-2 divided doses

Hypokalemia, digoxin toxicity (acetate, chloride)

• **Adult:** serum potassium conc >2.5 mEq/L: **IV** max 10 mEq/1 hr with 24-hr max dose 200 mEq, initial dose of 20-40 mEq has been recommended; **PO** 40-100 mEq/day in 2-4 divided doses

• **Child: IV** 0.25-0.5 mEq/kg/dose at 0.25-0.5 mEq/kg/hr; **PO** 2-5 mEq/day in divided doses

Available forms: Tabs for sol 6.5, 25 mEq; ext rel caps 8, 10 mEq; powder for sol 3.3, 5, 6.7, 10, 13.3 mEq/5 ml; tabs 2, 4, 5, 13.4 mEq; ext rel tabs 6.7, 8, 10 mEq; elix 6.7 mEq/5 ml; oral sol 2.375 mEq/5 ml; inj for prep of IV 1.5, 2, 2.4, 3, 3.2, 4.4, 4.7 mEq/ml

Administer:

PO route

• Do not break, crush, or chew ext rel tabs, caps or enteric products

• With or after meals; dissolve effervescent tabs, powder in 8 oz cold water or juice; do not give IM, SUBCUT

• Caps with full glass of liquid

IV route

• Through large-bore needle to decrease vein inflammation; check for extravasation; in large vein, avoid scalp vein in child (IV)

Potassium acetate

Additive compatibilities: Metoclopramide

Y-site compatibilities: Ciprofloxacin

Potassium chloride

• **Potassium chloride:** must be diluted; concentrated potassium injections fatal

Continuous IV INF route

• Conc max 80 mcg/L for peripheral line, 120 mEq/L for central line

• Dehydrated patients should receive 1 L of potassium-free hydrating solution then infuse 10 mEq/hr; in severe hypokalemia, rate may be 40 mEq/hr

Additive compatibilities: Aminophylline, amiodarone, atracurium, calcium gluconate, cefepime, cephalothin, cephapirin, chloramphenicol, cimetidine, ciprofloxacin, cisatracurium, clindamycin, cloxacillin, corticotropin, cytarabine, dimenhyDRINATE, DOPamine, DOXOrubicin liposome, enalaprilat, erythromycin, floxacillin, fluconazole, fosphenytoin, furosemide, heparin, hydrocortisone, isoproterenol, lidocaine, metaraminol, methicillin, methyldopate, metoclopramide, mitoXANtrone, nafcillin, netilmicin, norepinephrine, oxacillin, penicillin G potassium, phenylephrine, piperacillin, ranitidine, sodium bicarbonate, thiopental, vancomycin, verapamil, vit B/C

Y-site compatibilities: Acyclovir, aldesleukin, allopurinol, amifostine, aminophylline, amiodarone, ampicillin, amrinone, atropine, aztreonam, betamethasone, calcium gluconate, cephalothin, cephapirin, chlordiazePOXIDE, chlorproMAZINE, ciprofloxacin, cladribine, cyanocobalamin, dexamethasone, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOPamine, droperidol, edrophonium, enalaprilat, EPINEPHrine, esmolol, estrogens, ethacrynate, famotidine, fentaNYL, filgrastim, fludarabine, fluorouracil, furosemide, gallium, granisetron, heparin, hydrALAZINE, IDArubicin, indomethacin, insulin (regular), isoproterenol, kanamycin, labetalol, lidocaine, LORazepam, magnesium sulfate, melphalan, meperidine, methicillin, methoxamine, methylergonovine, midazolam, minocycline, morphine, neostigmine, norepinephrine, ondansetron, oxacillin, oxytocin, PACLitaxel, penicillin G potassium, pentazocine, phytonadione, piperacillin/tazobactam, prednisoLONE, procainamide, prochlorperazine, propofol, propranolol, pyridostigmine, remifentanil, sargramostim, scopolamine, sodium bicarbonate, succinylcholine, tacrolimus, teniposide, theophylline,

thiotepa, trimethaphan, trimethoenzamide, vinorelbine, warfarin, zidovudine

SIDE EFFECTS

CNS: Confusion
CV: Bradycardia, cardiac depression, dysrhythmias, arrest; peaking T waves, lowered R, depressed RST, prolonged P-R interval, widened QRS complex
GI: *Nausea, vomiting, cramps,* pain, *diarrhea,* ulceration of small bowel
GU: Oliguria
INTEG: Cold extremities, rash

PHARMACOKINETICS

PO: Excreted by kidneys and in feces; onset of action ≈30 min
IV: Immediate onset of action

INTERACTIONS

Increase: hyperkalemia—potassium phosphate IV; products containing calcium or magnesium; potassium-sparing diuretic or other potassium products; ACE inhibitors

NURSING CONSIDERATIONS

Assess:
• **Hyperkalemia:** indicates toxicity; fatigue, muscle weakness, confusion, dyspnea, palpitation; ECG for peaking T waves, lowered R, depressed RST, prolonged P-R interval, widening QRS complex, hyperkalemia; product should be reduced or discontinued, administer sodium bicarbonate (metabolic acidosis)
• Potassium level during treatment (3.5-5 mg/dl is normal level)
• Determine hydration status, I&O ratio; watch for decreased urinary output; notify prescriber immediately
• Cardiac status: rate, rhythm, CVP, PWP, PAWP if being monitored directly
Perform/provide:
• Storage at room temp
Evaluate:
• Therapeutic response: absence of fatigue, muscle weakness; decreased thirst, urinary output; cardiac changes
Teach patient/family:
• To add potassium-rich foods to diet: bananas, orange juice, avocados, whole grains, broccoli, carrots, prunes, cocoa after product is discontinued
• To avoid OTC products: antacids, salt substitutes, analgesics, vitamin preparations unless specifically directed by prescriber; to avoid licorice in large amounts because it may cause hypokalemia, sodium retention
• To report hyperkalemia symptoms (lethargy, confusion, diarrhea, nausea, vomiting, fainting, decreased output) or continued hypokalemia symptoms (fatigue, weakness, polyuria, polydipsia, cardiac changes)
• To dissolve powder or tablet completely in ≥120 ml water or juice
• About the importance of regular follow-up visits
• That potassium levels will need to be monitored periodically

potassium iodide (Rx)

Lugol's, SSKI, Strong Iodine
Func. class.: Thyroid hormone antagonist
Chem. class.: Iodine product

P

ACTION: Inhibits secretion of thyroid hormone, fosters colloid accumulation in thyroid follicles, decreases vascularity of gland

USES: Preparation for thyroidectomy, thyrotoxic crisis, neonatal thyrotoxicosis, radiation protectant, thyroid storm
Unlabeled uses: Erythema multiforme, erythema nodosum leprosum (ENL), sporotrichosis, thyroid involution induction

CONTRAINDICATIONS: Pregnancy (D), pulmonary edema, pulmonary TB, bronchitis, hypersensitivity to iodine
Precautions: Breastfeeding, children

DOSAGE AND ROUTES

Hyperthyroidism/thyrotoxicosis

• **Adult and child: PO** (SSKI) 250 mg tid × 10-14 days preoperatively

Preparation for thyroidectomy

• **Adult and child: PO** 3-5 gtt strong iodine sol tid or 1-5 drops SSKI in water tid after meals for 10 days prior to surgery

Radiation exposure (radioactive iodine)

• **Adult: PO** 130 mg/day (distribution by government/public health officials or OTC purchase)

• **Child ≥3 yr: PO** 65 mg q day

• **Child/infant >1 mo-3 yr: PO** 32 mg/day

• **Neonate: PO** 16 mg/day

Available forms: Oral sol (Lugol's solution) iodine 5%/potassium iodide 10%; oral sol (SSKI) 1 g/ml

Administer:

• Products are not interchangeable

• Strong iodine solution after diluting with water or juice to improve taste

• Through straw to prevent tooth discoloration

• With meals to decrease GI upset

• At same time each day to maintain product level

• At lowest dose that relieves symptoms; discontinue before RAIU

SIDE EFFECTS

CNS: Headache, confusion, paresthesias

EENT: Metallic taste, stomatitis, salivation, periorbital edema, sore teeth and gums, cold symptoms

ENDO: Hypothyroidism, hyperthyroid adenoma

GI: *Nausea, diarrhea, vomiting,* small-bowel lesions, upper gastric pain, metallic taste

INTEG: Rash, urticaria, angioneurotic edema, acne, mucosal hemorrhage, fever

MS: Myalgia, arthralgia, weakness

PHARMACOKINETICS

PO: Onset 24-48 hr, peak 10-15 days after continuous therapy, uptake by thyroid gland or excreted in urine, crosses placenta

INTERACTIONS

• Hypothyroidism: lithium, other antithyroid agents

Increased: hyperkalemia—angiotensin II receptor antagonist, ACE inhibitors, potassium salts, potassium-sparing diuretics

Drug/Lab Test

Interference: urinary 17-OHCS

NURSING CONSIDERATIONS

Assess:

• Pulse, B/P, temp; serum potassium

• I&O ratio; check for edema: puffy hands, feet, periorbit; indicate hypothyroidism

• Weight daily; same clothing, scale, time of day

• T_3, T_4, which is increased; serum TSH, which is decreased; free thyroxine index, which is increased if dosage is too low; discontinue product 3-4 wk before RAIU

⚠ Overdose: peripheral edema, heat intolerance, diaphoresis, palpitations, dysrhythmias, severe tachycardia, fever, delirium, CNS irritability

• **Hypersensitivity:** rash; enlarged cervical lymph nodes may indicate product should be discontinued

• **Hypoprothrombinemia:** bleeding, petechiae, ecchymosis

• Clinical response: after 3 wk should include increased weight, pulse; decreased T_4

Perform/provide:

• Fluids to 3-4 L/day unless contraindicated

Evaluate:

• Therapeutic response: weight gain; decreased pulse, T_4, size of thyroid gland

Teach patient/family:

• To abstain from breastfeeding after delivery

• To keep graph of weight, pulse, mood

• To avoid OTC products that contain iodine

• That seafood, other iodine products may be restricted

• Not to discontinue product abruptly; that thyroid crisis may occur as part of stress response

• That response may take several mo if thyroid is large
• To discontinue product, notify prescriber of fever, rash, metallic taste, swelling of throat; burning of mouth, throat; sore gums, teeth; severe GI distress, enlargement of thyroid, cold symptoms

pramipexole (Rx)

(pra-mi-pex'ol)

Mirapex, Mirapex ER

Func. class.: Antiparkinson agent
Chem. class.: DOPamine-receptor agonist, non-ergot

ACTION: Selective agonist for D_2 receptors (presynaptic/postsynaptic sites); binding at D_3 receptor contributes to antiparkinson effects

USES: Idiopathic Parkinson's disease, restless leg syndrome

CONTRAINDICATIONS: Hypersensitivity
Precautions: Pregnancy (C), cardiac/renal disease, MI with dysrhythmias, affective disorders, psychosis, preexisting dyskinesias, history of falling asleep during daily activities

DOSAGE AND ROUTES

Parkinson's disease
• **Adult: PO** 0.125 mg tid; increase gradually by 0.125 mg/dose at 5- to 7-day intervals until total daily dose of 4.5 mg/day reached; ER 0.375 mg daily initially then up to 0.75 mg/day, may increase by 0.75 mg/day no more than q5-7days as needed, max 4.5 mg/day

Restless leg syndrome
• **Adult: PO** 0.125 mg 2-3 hr prior to bedtime, increase gradually, max 0.5 mg/day

Renal dose
• **Adult: PO** CCr 35-59 ml/min, 0.125 mg bid, may increase q5-7days to 1.5 mg bid if required; CCr 15-34 ml/min, 0.125 mg/day, increase q5-7days to 1.5 mg/day

Available forms: Tabs 0.125, 0.25, 0.5, 1, 1.5 mg; ER tab 0.375, 0.75, 1.5, 3.0, 4.5 mg

Administer:
• Adjust dosage to patient response, titrate slowly, taper when discontinuing
• With meals to minimize GI symptoms
• Do not crush, chew, or break ext rel product

SIDE EFFECTS

CNS: *Agitation, insomnia,* psychosis, hallucinations, depression, dizziness, headache, confusion, amnesia, dream disorder, asthenia, dyskinesia, hypersomnolence, sudden sleep onset, impulse control disorders
CV: *Orthostatic hypotension,* edema, syncope, tachycardia, increased B/P, heart rate, heart failure
EENT: Blurred vision, retinal/vision deterioration
GI: *Nausea, anorexia,* constipation, dysphagia, dry mouth
GU: Impotence, urinary frequency
HEMA: Hemolytic anemia, leukopenia, agranulocytosis
INTEG: Pruritus

PHARMACOKINETICS

Minimally metabolized, peak 2 hr, half-life 8 hr, 8.5-12 hr in geriatric patients

INTERACTIONS

Increase: pramipexole levels—levodopa, cimetidine, ranitidine, diltiazem, triamterene, verapamil, quiNIDine
Decrease: pramipexole levels—DOPamine antagonists, phenothiazines, metoclopramide, butyrophenones

NURSING CONSIDERATIONS

Assess:
• **Parkinson's disease:** involuntary movements: bradykinesia, tremors, staggering gait, muscle rigidity, drooling
• B/P, ECG, respiration during initial treatment; hypo/hypertension should be reported

• Mental status: affect, mood, behavioral changes, depression; complete suicide assessment, worsening of symptoms of restless leg syndrome, impulse control disorders

⚠ Sleep attacks: may fall asleep during activities without warning; may need to discontinue medication

Perform/provide:

• Assistance with ambulation during beginning therapy

• Testing for diabetes mellitus, acromegaly if patient receiving long-term therapy

Evaluate:

• Therapeutic response: movement disorder improves

Teach patient/family:

• That therapeutic effects may take several weeks to a few months

• To change positions slowly to prevent orthostatic hypotension

• To use product exactly as prescribed: if product is discontinued abruptly, parkinsonian crisis may occur; to avoid alcohol, OTC sleeping products

• To notify prescriber if pregnancy is planned or suspected

• To notify prescriber of impulse control disorders: shopping

pramlintide (Rx)

(pram'lin-tide)

Symlin

Func. class.: Antidiabetic

Chem. class.: Synthetic human amylin analog

ACTION: Modulates and slows stomach emptying, prevents postprandial rise in plasma glucagon, decreases appetite, leads to decreased caloric intake and weight loss

USES: As an adjunct to insulin therapy for uncontrolled type 1 or type 2 diabetes

CONTRAINDICATIONS: Hypersensitivity to this product or cresol; gastroparesis

Black Box Warning: Hypoglycemia

Precautions: Pregnancy (C), breastfeeding

DOSAGE AND ROUTES

Type 1 diabetes

• **Adult: SUBCUT** before each meal (≥30 g carbohydrate), titrate up in 15-mcg increments to target dose of 60 mcg/dose; each dose titration should occur after no nausea for 3 days

Type 2 diabetes

• **Adult: SUBCUT** 60 mcg prior to each meal (≥30 g CHO), titrate up to 120 mcg **SUBCUT** with each meal after no nausea for 3-7 days

Available forms: Inj 5-ml vials (0.6 mg/ml)

Administer:

• Premeal insulin should be decreased by 50% when starting and adjusted to therapeutic dose to prevent hypoglycemia

SUBCUT route

• Rotate injection sites, allow solution to warm to room temperature before use

• Take immediately before mealtime or if 30 g of carbohydrates will be consumed

• Do not use if a meal is skipped

• Do not use if discolored; do not give in arm; absorption is variable

Syringe compatibilities: Do not mix with insulin; give separately

SIDE EFFECTS

CNS: *Headache,* fatigue, dizziness
GI: *Nausea, vomiting, anorexia,* abdominal pain
INTEG: Inj site reactions
META: Hypoglycemia
MS: Arthralgia
RESP: *Cough,* pharyngitis
SYST: *Systemic allergy*

PHARMACOKINETICS

Bioavailability 30%-40%, not extensively bound to blood cells or albumin, 40% bound in plasma, half-life 48 min, me-

tabolized by kidneys, peak 20 min, duration 3 hr

INTERACTIONS

• Do not use with erythromycin, metoclopramide

Increase: effect of acetaminophen

Increase: pramlintide action—antimuscarinics, α-glucosidase inhibitors, diphenoxylate, loperamide, octreotide, opiate agonist, tricyclics

Increase: hypoglycemia—ACE inhibitors, disopyramide, anabolic steroids, androgens, fibric acid derivatives, alcohol, corticosteroids, insulin

Increase: hyperglycemia—phenothiazines

Decrease: hypoglycemia—niacin, dextrothyroxine, thiazide diuretics, triamterene, estrogens, progestins, oral contraceptives, MAOIs

NURSING CONSIDERATIONS

Assess:

• Fasting blood glucose, 2 hr post-prandiol (80-150 mg/dl, normal fasting level; 70-130 mg/dl, normal 2 hr level); A1c may also be drawn to identify treatment effectiveness; also monitor weight, appetite

• **Hypoglycemic reaction** sweating; weakness; dizziness; chills; confusion; headache; nausea; rapid, weak pulse; fatigue; tachycardia; memory lapses; slurred speech; staggering gait; anxiety; tremors; hunger

• **Hyperglycemia:** acetone breath; polyuria; fatigue; polydipsia; flushed, dry skin; lethargy

Perform/provide:

• Storage at room temp for ≤30 days; keep away from heat and sunlight; refrigerate all other supply

Evaluate:

• Therapeutic response: decrease in polyuria, polydipsia, polyphagia; clear sensorium; absence of dizziness; stable gait; improving blood glucose, A1c

Teach patient/family:

• That product does not cure diabetes but rather controls symptoms

• To carry emergency ID as diabetic

• To recognize hypoglycemia reaction: headache, fatigue, weakness

• About the dosage, route, mixing instructions, diet restrictions, disease process

• To carry a glucose source (candy or lump sugar) to treat hypoglycemia

• About the symptoms of ketoacidosis: nausea; thirst; polyuria; dry mouth; decreased B/P; dry, flushed skin; acetone breath; drowsiness; Kussmaul respirations

• That a plan is necessary for diet, exercise; that all food on diet should be eaten; that exercise routine should not vary

• About blood glucose testing; how to determine glucose level

• To avoid OTC products, alcohol unless directed by prescriber

• Not to operate machinery or drive until effect is known

• About how to use pen

TREATMENT OF OVERDOSE:

Glucose 25 g IV or 50 ml dextrose 50% sol or 1 mg glucagon SUBCUT

pramoxine topical

See Appendix B

P

prasugrel (Rx)

(pra'soo-grel)

Effient

Func. class.: Platelet aggregation inhibitor

Chem. class.: ADP receptor antagonist

ACTION: Inhibits ADP-induced platelet aggregation

USES: Reducing the risk of stroke, MI, vascular death, peripheral arterial disease in high-risk patients

CONTRAINDICATIONS: Hypersensitivity, stroke, TIA

Black Box Warning: Active bleeding

Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, hepatic disease, increased bleeding risk, neutropenia, agranulocytosis, renal disease, surgery, trauma, thrombotic thrombocytopenic purpura, Asian patients, weight <60 kg, CABG, abrupt discontinuation

DOSAGE AND ROUTES

- **Adult/geriatric <75 yr and ≥60 kg:** **PO** 60-mg loading dose then 10 mg daily with aspirin (75-325 mg/day)
- **Adult/geriatric <75 yr and <60 kg:** **PO** 60 mg loading dose then 5 mg daily
- **Geriatric >75 yr:** not recommended

Available forms: Tabs 5, 10 mg

Administer:

- With food to decrease gastric symptoms
- Do not break tablets
- Do not discontinue therapy abruptly

SIDE EFFECTS

CNS: Headache, dizziness
CV: Edema, atrial fibrillation, bradycardia, chest pain, hypo/hypertension
GI: Nausea, vomiting, diarrhea
HEMA: Epistaxis, leukopenia, thrombocytopenia, neutropenia, anaphylaxis, angioedema, anemia
INTEG: Rash, hypercholesterolemia
MISC: Fatigue, intracranial hemorrhage, secondary malignancy, angioedema
MS: Back pain

PHARMACOKINETICS

Rapidly absorbed; peak 30 min; metabolized by liver (CYP3A4; CYP2B6); excreted in urine, feces; half-life 7 hr

INTERACTIONS

Increase: bleeding risk—anticoagulants, aspirin, NSAIDs, abciximab, eptifibatide, tirofiban, thrombolytics, ticlopidine, SSRIs, treprostinil, rifampin

NURSING CONSIDERATIONS

Assess:

⚠ **Thrombotic/thrombocytic purpura:** fever, thrombocytopenia, neurolytic anemia

- Hepatic studies: AST, ALT, bilirubin, creatinine with long-term therapy
- Blood studies: CBC, differential, Hct, Hgb, PT, cholesterol with long-term therapy

Black Box Warning: **Bleeding:** may be fatal, decreased B/P in those who have had CABG may be the first indication; bleeding should be controlled while continuing product; may use transfusion; do not use within 1 wk of CABG; may use lower doses in those <60 kg

Evaluate:

- Therapeutic response: absence of stroke, MI

Teach patient/family:

- That blood work will be necessary during treatment
- To report any unusual bruising, bleeding to prescriber; that it may take longer to stop bleeding
- To take with food or just after eating to minimize GI discomfort
- To report diarrhea, skin rashes, subcutaneous bleeding, chills, fever, sore throat
- To tell all health care providers that prasugrel is being used; that product may be held before surgery

pravastatin (Rx)

(pra'va-sta-tin)

Pravachol

Func. class.: Antilipemic

Chem. class.: HMG-CoA reductase enzyme

Do not confuse:

Pravachol/Prevacid/propranolol

ACTION: Inhibits HMG-CoA reductase enzyme, which reduces cholesterol synthesis

USES: As an adjunct for primary hypercholesterolemia (types IIa, IIb, III, IV), to reduce the risk for recurrent MI, atherosclerosis, primary/secondary CV events, stroke, TIAs

CONTRAINDICATIONS:

Pregnancy (X), breastfeeding, hypersensitivity, active hepatic disease

Precautions: Past hepatic disease, alcoholism, severe acute infections, trauma, severe metabolic disorders, electrolyte imbalances

DOSAGE AND ROUTES

- **Adult: PO** 40 mg/day at bedtime (range 10-80 mg/day); start at 10 mg/day if patient also taking immunosuppressants
- **Adolescent 14-18 yr: PO** 40 mg/day
- **Child 8-13 yr: PO** 20 mg/day
- **Geriatric/renal/hepatic disease: PO** 10 mg/day initially

Renal dose

- **Adult: PO** 10-20 mg daily at bedtime, increase at 4-wk intervals

Available forms: Tabs 10, 20, 40, 80 mg

Administer:

- Without regard to meals, at bedtime
- Give 4 hr after bile acid sequestrants

SIDE EFFECTS

CNS: Headache, dizziness, fatigue
CV: Chest pain
EENT: Lens opacities
GI: Nausea, constipation, diarrhea, flatus, abdominal pain, heartburn, hepatic dysfunction, pancreatitis, hepatitis
GU: Renal failure (myoglobinuria)
INTEG: Rash, pruritus
MS: Muscle cramps, myalgia, myositis, rhabdomyolysis
RESP: Common cold, rhinitis, cough

PHARMACOKINETICS

Peak 1-1½ hr; metabolized by liver; protein binding 50%; excreted in urine 20%, feces 70%, breast milk; crosses placenta; half-life 1.25-2.25 hr

INTERACTIONS

Increase: myopathy, rhabdomyolysis risk—erythromycin, niacin, cycloSPORINE, gemfibrozil, clofibrate, clarithromycin, itraconazole, protease inhibitors
Decrease: bioavailability of pravastatin—bile acid sequestrants

Drug/Herb

Increase: adverse reactions—red yeast rice
Increase: hepatotoxicity—eucalyptus
Decrease: effect—St. John's wort

Drug/Lab Test

Increase: CK, LFTs
Altered: thyroid function tests

NURSING CONSIDERATIONS

Assess:

- Fasting lipid profile: LDL, HDL, triglycerides, cholesterol at baseline, q12wk, then q6mo when stable; obtain diet history
- Hepatic studies: baseline, q12wk, then q6mo for remainder of yr; AST, ALT, LFTs may increase
- Renal studies of patients with compromised renal systems: BUN, I&O ratio, creatinine

⚠ **Rhabdomyolysis:** muscle tenderness, pain; obtain CPK at baseline and if these occur, therapy should be discontinued

Perform/provide:

- Storage in cool environment in tight container protected from light

Evaluate:

- Therapeutic response: decrease in LDL total cholesterol, triglycerides; increase in HDL

Teach patient/family:

- That blood work will be necessary during treatment

⚠ To report blurred vision, severe GI symptoms, dizziness, headache, muscle pain, weakness, fever

- That regimen will continue: low-cholesterol diet, exercise program

⚠ To report suspected, planned pregnancy; not to use product during pregnancy, pregnancy category (X); not to breastfeed

P

• **Hepatic disease:** to notify prescriber of lack of appetite, yellow sclera/skin, dark urine, abdominal pain, weakness

prazosin (Rx)

(pray'zoe-sin)

Minipress

Func. class.: Antihypertensive

Chem. class.: α_1-Adrenergic blocker, peripheral

ACTION: Blocks α-mediated vasoconstriction of adrenergic receptors, thereby inducing peripheral vasodilation

USES: Hypertension

Unlabeled uses: Benign prostatic hypertrophy to decrease urine outflow obstruction, heart failure, hypertensive urgency, Raynaud's phenomenon, posttraumatic stress disorder (PTSD)

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, renal/hepatic disease, prostate cancer, ocular surgery, orthostatic hypotension

DOSAGE AND ROUTES

Hypertension

• **Adult: PO** 1 mg bid or tid increasing to 20 mg/day in divided doses, if required; usual range 6-15 mg/day, max 1 mg initially; max 20 mg/day, some may require 40 mg/day

• **Child (unlabeled): PO** 5 mcg/kg q6hr; max 400 mcg/kg/day or 15 mg/day

Benign prostatic hyperplasia (unlabeled)

• **Adult: PO** 2 mg bid

Raynaud's phenomenon (unlabeled)

• **Adult: PO** 0.5-3 mg bid

CHF (unlabeled)

• **Adult: PO** 1 mg bid-tid, may gradually increase to max 20 mg/day

• **Child: PO** 5 mcg/kg q6hr, may gradually increase to 25 mcg/kg q6hr

Hypertensive urgency (unlabeled)

• **Adult: PO** 10-20 mg, may repeat after 30 min

Available forms: Caps 1, 2, 5 mg

Administer:

• 1st dose at bedtime to avoid fainting

• Without regard to meals

• Store at room temperature

SIDE EFFECTS

CNS: *Dizziness, headache, drowsiness,* anxiety, depression, vertigo, *weakness,* fatigue

CV: *Palpitations,* orthostatic hypotension, tachycardia, edema, rebound hypertension

EENT: Blurred vision, epistaxis, tinnitus, dry mouth, red sclera

GI: *Nausea,* vomiting, diarrhea, constipation, abdominal pain

GU: Urinary frequency, incontinence, impotence, priapism; water, sodium retention

PHARMACOKINETICS

Onset 2 hr, peak 2-4 hr, duration 6-12 hr, half-life 2-4 hr; metabolized in liver, excreted via bile, feces (>90%), urine (<10%); protein binding 97%

INTERACTIONS

Increase: hypotensive effects—β-blockers, nitroglycerin, alcohol, phosphodiesterase inhibitors (vardenafil, tadalafil, sildenafil); diuretics, other antihypertensives, MAOIs

Decrease: antihypertensive effect—NSAIDs

Increase: antihypertensive effect—hawthorn

Drug/Lab Test

Increase: urinary norepinephrine, VMA

NURSING CONSIDERATIONS

Assess:

• **Hypertension/CHF:** B/P (sitting, standing) during initial treatment, periodically thereafter; pulse, jugular venous distention

• BUN, uric acid if patient receiving long-term therapy
• Weight daily, I&O; edema in feet, legs daily
• **Benign prostatic hypertrophy (unlabeled):** urinary patterns, frequency, stream, dribbling; flow before, during, and after therapy

Evaluate:
• Therapeutic response: decreased B/P

Teach patient/family:
• That fainting occasionally occurs after 1st dose; to take 1st dose at bedtime; not to drive or operate machinery for 4 hr after 1st dose; that full effect may take 4-6 wk
• To change positions slowly to prevent orthostatic hypotension
• To avoid OTC medications unless approved by prescriber

TREATMENT OF OVERDOSE:
Administer volume expanders or vasopressors, discontinue product, place patient in supine position

prednisoLONE (Rx)
(pred-niss'oh-lone)
Flo-Pred, Millipred, Orapred, Orapred ODT, Veripred
Func. class.: Corticosteroid, synthetic
Chem. class.: Glucocorticoid, immediate acting

Do not confuse:
prednisoLONE/predniSONE

ACTION:
Decreases inflammation by the suppression of migration of polymorphonuclear leukocytes, fibroblasts; reversal to increase capillary permeability and lysosomal stabilization

USES:
Severe inflammation, immunosuppression, neoplasms

CONTRAINDICATIONS:
Hypersensitivity, fungal infections, viral infection, varicella

Precautions: Pregnancy (C), breastfeeding, children, diabetes mellitus, glaucoma, osteoporosis, seizure disorders, ulcerative colitis, CHF, myasthenia gravis, abrupt discontinuation, children, acute MI, GI ulcers, hypertension, hepatitis, psychosis

DOSAGE AND ROUTES
Rheumatic disorders
• **Adult: PO** 5-60 mg/day or in divided doses

Asthma/antiinflammatory
• **Adult: PO** 40-80 mg/day in 1-2 divided doses
• **Child: PO** 1 mg/kg/day in 2 divided doses

Available forms: Tabs 5 mg; oral dissolving tab 10, 15, 30 mg; oral sol 5 mg/5 ml, 10 mg/5 ml, 15 mg/5 ml, 25 mg/5 ml; syrup 5 mg/5 ml

Administer:
• **Oral sol:** use calibrated measuring device
• **Orally disintegrating tabs:** place on tongue; allow to dissolve, swallow or swallow whole; do not cut, split

SIDE EFFECTS
CNS: *Depression,* flushing, sweating, headache, mood changes
CV: *Hypertension,* circulatory collapse, thrombophlebitis, embolism, tachycardia
EENT: Fungal infections, increased intraocular pressure, blurred vision
GI: *Diarrhea, nausea, abdominal distention,* GI hemorrhage, increased appetite, pancreatitis
HEMA: Thrombocytopenia
INTEG: Acne, poor wound healing, ecchymosis, petechiae
MS: Fractures, osteoporosis, weakness, arthralgia, myopathy, tendon rupture

PHARMACOKINETICS
PO: Peak 1-2 hr, duration 2 days

P

INTERACTIONS

Increase: side effects—alcohol, salicylates, indomethacin, amphotericin B, digitalis, cycloSPORINE, diuretics

Increase: prednisoLONE action—salicylates, estrogens, indomethacin, oral contraceptives, ketoconazole, macrolide antibiotics

Increase: toxicity—azole antifungals, cycloSPORINE

Decrease: prednisoLONE action—cholestyramine, colestipol, barbiturates, rifampin, ePHEDrine, phenytoin, theophylline

Decrease: effects of anticoagulants, anticonvulsants, antidiabetics, ambenonium, neostigmine, isoniazid, toxoids, vaccines, anticholinesterases, salicylates, somatrem

Drug/Lab Test

Increase: cholesterol, sodium, blood glucose, uric acid, calcium, urine glucose

Decrease: calcium, potassium, T_4, T_3, thyroid ^{131}I uptake test, urine 17-OHCS, 17-KS, PBI

False negative: skin allergy tests

NURSING CONSIDERATIONS

Assess:

- Potassium, blood glucose, urine glucose while patient receiving long-term therapy; hypokalemia, hyperglycemia
- Weight daily; notify prescriber if weekly gain of >5 lb
- B/P q4hr, pulse; notify prescriber if chest pain occurs
- I&O ratio; be alert for decreasing urinary output, increasing edema
- Plasma cortisol levels with long-term therapy; normal level: 138-635 nmol/L SI units when drawn at 8 AM
- **Infection:** increased temp, WBC, even after withdrawal of medication; product masks infection
- **Potassium depletion:** paresthesias, fatigue, nausea, vomiting, depression, polyuria, dysrhythmias, weakness
- Edema, hypertension, cardiac symptoms
- Mental status: affect, mood, behavioral changes, aggression
- **Adrenal insufficiency:** nausea, vomiting, lethargy, restlessness, confusion, weight loss, hypotension before, during treatment; HPA suppression may be precipitated by abrupt withdrawal

Evaluate:

- Therapeutic response: ease of respirations, decreased inflammation

Teach patient/family:

- That emergency ID as steroid user should be carried
- To notify prescriber if therapeutic response decreases; that dosage adjustment may be needed
- Not to discontinue abruptly; that adrenal crisis can result; to take product exactly as prescribed
- To avoid OTC products: salicylates, cough products with alcohol, cold preparations unless directed by prescriber
- About cushingoid symptoms
- About the symptoms of adrenal insufficiency: nausea, anorexia, fatigue, dizziness, dyspnea, weakness, joint pain

prednisoLONE ophthalmic (Rx)

See Appendix B

predniSONE (Rx)

(pred'ni-sone)

Rayos, Winpred ♣

Func. class.: Corticosteroid

Chem. class.: Intermediate-acting glucocorticoid

Do not confuse:
predniSONE/methylPREDNISolone/prednisoLONE/PriLOSEC

ACTION: Decreases inflammation by increasing capillary permeability, and lysosomal stabilization, minimal mineralocorticoid activity

USES: Severe inflammation, immunosuppression, neoplasms, multiple sclerosis, collagen disorders, dermatologic disorders
Unlabeled uses: Adjunct for refractory seizures, infantile spasms, acute interstitial nephritis, amyloidosis, autoimmune hepatitis, Behçet's syndrome, Bell's palsy, carpal tunnel syndrome, Churg-Strauss syndrome, dermatomyositis, Duchenne muscular dystrophy, endophthalmitis, Lennox-Gastaut syndrome, lupus nephritis, mixed connective-tissue disease, pericarditis, pneumonia, polyarteritis nodosa, polychondritis, polymyositis, pulmonary fibrosis, rheumatic carditis, temporal arteritis, TB, Wegener's granulomatosis

CONTRAINDICATIONS: Fungal infections
Precautions: Pregnancy (C), diabetes mellitus, glaucoma, osteoporosis, seizure disorders, ulcerative colitis, CHF, myasthenia gravis, renal disease, esophagitis, peptic ulcer, cataracts, coagulopathy, abrupt discontinuation, children, corticosteroid hypertensitivity, Cushing's syndrome, diabetes mellitus, ulcerative colitis

DOSAGE AND ROUTES

- **Adult: PO** 5-60 mg/day or divided bid-qid
- **Child: PO** 0.05-2 mg/kg/day divided 1-4×/day

Nephrosis
- **Child: PO** 2 mg/kg/day in divided doses, max 28 days, then 1-1.5 mg/kg/day every other day × 4 wk

Multiple sclerosis
- **Adult: PO** 200 mg/day × 1 wk then 80 mg every other day × 1 mo

Available forms: Tabs 1, 2.5, 5, 10, 20, 50 mg; oral sol 5 mg/5 ml; syr 5 mg/5 ml, del rel tab 1, 2, 5 mg
Administer:
- For long-term use, alternate-day therapy recommended to decrease adverse reactions; give in AM to coincide with normal cortisol secretion
- Titrated dose; use lowest effective dose
- With food or milk to decrease GI symptoms
- **Oral sol:** use calibrated measuring device
- **Del rel tab:** swallow whole, do not break, crush, chew; give once a day

SIDE EFFECTS

CNS: Depression, flushing, sweating, headache, mood changes
CV: Hypertension, circulatory collapse, thrombophlebitis, embolism, tachycardia
EENT: Fungal infections, increased intraocular pressure, blurred vision
GI: Diarrhea, nausea, abdominal distention, GI hemorrhage, increased appetite, pancreatitis
HEMA: Thrombocytopenia
INTEG: Acne, poor wound healing, ecchymosis, petechiae
META: Hyperglycemia
MS: Fractures, osteoporosis, weakness

PHARMACOKINETICS

PO: Well absorbed PO, peak 1-2 hr, duration 1-1½ days, half-life 3½-4 hr, biologic terminal half-life 18-36 hr, crosses placenta, enters breast milk, metabolized by liver after conversion, excreted in urine

INTERACTIONS

Increase: side effects—alcohol, salicylates, indomethacin, amphotericin B, digoxin, cycloSPORINE, diuretics
Increase: predniSONE action—salicylates, estrogens, indomethacin, oral contraceptives, ketoconazole, macrolide antiinfectives
Decrease: predniSONE action—cholestyramine, colestipol, barbiturates, rifampin, ePHEDrine, phenytoin, theophylline
Decrease: effects of anticoagulants, anticonvulsants, antidiabetics, ambenonium, neostigmine, isoniazid, toxoids, vaccines, anticholinesterases, salicylates, somatrem

Drug/Herb
Decrease: predniSONE effect—ephedra (ma huang)
Drug/Lab Test
Increase: cholesterol, sodium, blood glucose, uric acid, calcium, urine glucose
Decrease: calcium, potassium, T_4, T_3, thyroid ^{131}I uptake test, urine 17-OHCS, 17-KS, PBI
False negative: skin allergy tests

NURSING CONSIDERATIONS

Assess:
• **Adrenal insufficiency:** nausea, vomiting, anorexia, confusion, hypotension, weight loss before, during treatment; HPA suppression may be precipitated by abrupt withdrawal
• Potassium, blood glucose, urine glucose while patient receiving long-term therapy; hypokalemia and hyperglycemia; plasma cortisol with long-term therapy, normal: 138-635 nmol/L SI units drawn at 8 AM
• Weight daily; notify prescriber of weekly gain of >5 lb
• B/P, pulse; notify prescriber of chest pain; monitor for crackles, dyspnea if edema is present; hypertension, cardiac symptoms
• I&O ratio; be alert for decreasing urinary output, increasing edema
• **Infection:** increased temp, WBC, even after withdrawal of medication; product masks infection
• Potassium depletion: paresthesias, fatigue, nausea, vomiting, depression, polyuria, dysrhythmias, weakness
• Mental status: affect, mood, behavioral changes, aggression
Evaluate:
• Therapeutic response: ease of respirations, decreased inflammation
Teach patient/family:
• That emergency ID as corticosteroid user should be carried; provide information about product being taken and condition
• To notify prescriber if therapeutic response decreases; that dosage adjustment may be needed
• To avoid vaccinations
⚠ Not to discontinue abruptly because adrenal crisis can result
• To avoid OTC products: salicylates, cough products with alcohol, cold preparations unless directed by prescriber
• **Cushingoid symptoms:** moon face, weight gain; symptoms of adrenal insufficiency: nausea, anorexia, fatigue, dizziness, dyspnea, weakness, joint pain
• That product causes immunosuppression; to report any symptoms of infection (fever, sore throat, cough)
• To notify prescriber if pregnancy is planned or suspected; cleft palate, stillbirth, abortion reported

pregabalin (Rx)

(pre-gab'a-lin)
Lyrica
Func. class.: Anticonvulsant
Chem. class.: γ-Aminobutyric acid (GABA) analog

Controlled Substance Schedule V

ACTION: Binds to high-voltage–gated calcium channels in CNS tissues; this may lead to anticonvulsant action similar to the inhibitory neurotransmitter GABA; anxiolytic, analgesics, and antiepileptic properties

USES: Neuropathic pain associated with spinal cord injury/diabetic peripheral neuropathy, partial-onset seizures, postherpetic neuralgia, fibromyalgia
Unlabeled uses: Moderate pain, social anxiety disorder

CONTRAINDICATIONS: Hypersensitivity, abrupt discontinuation
Precautions: Pregnancy (C), breastfeeding, children <12 yr, geriatric pa-

tients, renal disease, PR interval prolongation, creatine kinase elevations, CHF (class III, IV), decreased platelets, substance abuse, dependence, glaucoma, myopathy, angioedema history, suicidal behavior

DOSAGE AND ROUTES

Diabetic peripheral neuropathic pain

• **Adult: PO** 50 mg tid, may increase to 300 mg/day (max) within 1 wk, adjust in patients with renal disease

Partial-onset seizures

• **Adult: PO** 75 mg bid or 50 mg tid; may increase to 600 mg/day (max)

Postherpetic neuralgia

• **Adult: PO** 150 mg/day in 2-3 divided doses, may increase to 300 mg/day in 2-3 divided doses; if higher dose is required after 2-4 wk, may increase to 600 mg/day in 2-3 divided doses

Fibromyalgia

• **Adult: PO** 75 mg bid, may increase to 150 mg bid within 1 wk and 225 mg bid after 1 wk

Renal dose

• **Adult: PO** CCr 30-60 ml/min, 75-300 mg/day in 2-3 divided doses; CCr 15-30 ml/min, 25-150 mg/day in 1-2 divided doses; CCr <15 ml/min, 25-75 mg/day as a single dose

Social phobia (unlabeled)

• **Adult: PO** 150-600 mg/day in 3 divided doses

Available forms: Caps 25, 50, 75, 100, 150, 200, 225, 300 mg; oral sol 20 mg/ml

Administer:

• Do not crush or chew caps; caps may be opened and contents put in applesauce or dissolved in juice

• Give without regard to meals

• Gradually withdraw over 7 days; abrupt withdrawal may precipitate seizures

SIDE EFFECTS

CNS: Dizziness, fatigue, confusion, euphoria, incoordination, nervousness, neuropathy, tremor, vertigo, somnolence, ataxia, amnesia, abnormal thinking, suicidal ideation

EENT: Dry mouth, blurred vision, nystagmus, amblyopia, sinusitis

GI: Constipation, flatulence, abdominal pain, weight gain

GU: Gynecomastia

HEMA: Ecchymosis, thrombocytopenia

MS: Back pain, rhabdomyolysis, myopathy

OTHER: Pruritus, orgasm/erectile dysfunction, peripheral edema, angioedema

RESP: Dyspnea

PHARMACOKINETICS

Well absorbed, absorption decreased with food; peak 1.5 hr; 90% recovered in urine unchanged; negligible metabolism; not bound to plasma proteins; half-life 6 hr

INTERACTIONS

Increase: weight gain/fluid retention—thiazolidinedione; avoid use if possible

Increase: CNS depression—anxiolytics, sedatives, hypnotics, barbiturates, general anesthetics, opiate agonists, phenothiazines, sedating H_1 blockers, thiazolidinediones, tricyclics, alcohol

Drug/Lab Test

Increase: creatine kinase

Decrease: platelets

NURSING CONSIDERATIONS

Assess:

• **Seizures:** aura, location, duration, activity at onset, use seizure precaution

• **Pain:** location, duration, characteristics if using for diabetic neuropathy

• Renal studies: urinalysis, BUN, urine creatinine q3mo, creatine kinase; if markedly increased, discontinue product

⚠ Mental status: mood, sensorium, affect, behavioral changes, suicidal thoughts/behaviors; if mental status changes, notify prescriber

• **Angioedema/hypersensitivity:** monitor for blisters, hives, rash, dyspnea, wheezing; angioedema; if these occur,

discontinue; cross-hypersensitivity with this product and gabapentin may occur
• **Rhabdomyolysis and creatinine kinase elevations:** monitor for muscle pain, tenderness, weakness accompanied by malaise or fever; product should be discontinued

Evaluate:
• Therapeutic response: decreased seizure activity; decrease in neuropathic pain

Teach patient/family:
• To carry emergency ID stating patient's name, products taken, condition, prescriber's name and phone number
• To avoid driving, other activities that require alertness because dizziness, drowsiness may occur
• Not to discontinue medication quickly after long-term use, to taper over ≥1 wk; that withdrawal-precipitated seizures may occur; not to double doses if dose is missed, to take if 2 hr or more before next dose
• To notify prescriber if pregnancy planned or suspected; to avoid breastfeeding
• To report muscle pain, tenderness, weakness when accompanied by fever, malaise, suicidal thoughts/behaviors
• To avoid alcohol

TREATMENT OF OVERDOSE:
Lavage, VS, hemodialysis

primaquine (Rx)
(prim'a-kween)
Func. class.: Antimalarial
Chem. class.: Synthetic 8-aminoquinolone

ACTION:
Unknown; thought to destroy exoerythrocytic forms by gametocidal action

USES:
Malaria caused by *Plasmodium vivax;* in combination with clindamycin for *Pneumocystis jiroveci* pneumonia

CONTRAINDICATIONS:
Lupus erythematosus, rheumatoid arthritis; hypersensitivity to this product or idoquinol
Precautions: Pregnancy (C), breastfeeding, methemoglobin reductase deficiency

Black Box Warning: Bone marrow suppression, hemolytic anemia, G6PD deficiency

DOSAGE AND ROUTES
• **Adult: PO** 15-30 mg (base)/day × 2 wk or 45 mg (base)/day × 8 wk; 26.3-mg tab is 15-mg base
• **Child: PO** 0.5 mg/kg (0.3 mg/base/day) daily × 2 wk
Available forms: Tabs 26.3 mg
Administer:
PO route
• Before or after meals at same time each day to maintain product level; take with food to decrease GI upset

SIDE EFFECTS
CNS: Headache, dizziness
CV: Hypertension, dysrhythmias
EENT: *Blurred vision, difficulty focusing*
GI: *Nausea, vomiting, anorexia,* cramps
HEMA: Agranulocytosis, granulocytopenia, leukopenia, hemolytic anemia, leukocytosis, mild anemia, methemoglobinemia
INTEG: Pruritus, skin eruptions, pallor, weakness

PHARMACOKINETICS
PO: Metabolized by liver (metabolites), half-life 3.7-9.6 hr

INTERACTIONS
• Toxicity: quinacrine
Decrease: effect of carBAMazepine, PHENobarbital, phenytoins, rifamycins, nafcillin
Drug/Food
Increase: primaquine effect—food
Decrease: primaquine effect—grapefruit juice

Drug/Lab Test
Increase: WBC
Decrease: WBC, RBC, Hgb

NURSING CONSIDERATIONS

Assess:
- Ophthalmic test if patient receiving long-term treatment or product dosage of >150 mg/day
- Hepatic studies weekly: AST, ALT, bilirubin if patient receiving long-term therapy
- Blood studies: CBC; blood dyscrasias occur
- Allergic reactions: pruritus, rash, urticaria
- Blood dyscrasias: malaise, fever, bruising, bleeding (rare)
- Renal status: dark urine, hematuria, decreased output

Hemolytic reaction: chills, fever, chest pain, cyanosis; product should be discontinued immediately; hemolytic anemia may be severe in patients of Asian, Mediterranean descent

Evaluate:
- Therapeutic response: decreased symptoms of malaria

Teach patient/family:
- To report visual problems, fever, fatigue, dark urine, bruising, bleeding; may indicate blood dyscrasias
- To complete full course of therapy
- That an eye exam will be needed q4-6mo if using product for an extended period of time

primidone (Rx)

(pri'mi-done)

Mysoline, Sertan ✤

Func. class.: Anticonvulsant

Chem. class.: Barbiturate derivative

ACTION: Raises seizure threshold by conversion of product to PHENobarbital, decreases neuron firing

USES: Generalized tonic-clonic (grand mal), complex seizures

Unlabeled uses: Benign familial tremor (essential tremor)

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, hypersensitivity, porphyria, hepatic encephalopathy

Precautions: Hyperactive children, COPD, renal/hepatic disease, suicidal ideation/behavior

DOSAGE AND ROUTES

- **Adult and child >8 yr: PO** 125-250 mg at bedtime, increase by 125-250 mg/day q3-7days, usual dose 750-1500 mg/day in 3-4 divided doses, max 2 g/day in divided doses
- **Child <8 yr: PO** 50-125 mg at bedtime, increase by 50-125 mg/day q3-7days, usual dose 10-25 mg/kg/day in 3-4 divided doses
- **Neonate: PO** 12-20 mg/kg/day in 2-4 divided doses, start at lower dose and titrate

Benign familial tremor/essential tremor (unlabeled)
- **Adult: PO** 50-62.5 mg, increase as tolerated up to 750 mg/day in 3 divided doses

Renal dose
- **Adult: PO** CCr 10-50 ml/min, increase interval between doses to 8-12 hr; CCr <10 ml/min, increase interval to 12-24 hr

Available forms: Tabs 50, 250 mg; susp 250 mg/5 ml ✤; chew tabs 125 mg ✤

Administer:

PO route
- After shaking liquid susp well
- With food for GI upset
- Tablets crushed and mixed with food or fluid for swallowing difficulties
- Avoid use with CNS depressants

SIDE EFFECTS

CNS: *Stimulation, drowsiness,* irritability, psychosis, ataxia, vertigo, fatigue, emotional disturbances, mood changes, paranoia, suicidal ideation

EENT: Diplopia, nystagmus, edema of eyelids

GI: *Nausea, vomiting, anorexia,* hepatitis
GU: Impotence
HEMA: Thrombocytopenia, leukopenia, neutropenia, eosinophilia, megaloblastic anemia, decreased serum folate level, lymphadenopathy
INTEG: *Rash,* edema, alopecia, lupuslike syndrome

PHARMACOKINETICS

PO: Peak 4 hr; metabolized in liver; excreted by kidneys, in breast milk; half-life 10-12 hr (primidone)

INTERACTIONS

- Primidone levels decreased by acetaZOLAMIDE, succinimides
- May decrease effect of oral contraceptives, acebutolol, metoprolol, propranolol, tricyclics, phenothiazines, lamoTRIgine, estrogens, non-oral combination contraceptives, progestins

Increase: primidone levels—alcohol, heparin, CNS depressants, isoniazid, nicotinamide, MAOIs
Increase: toxicity—CYP3A4 inhibitors (aprepitant, antiretroviral protease inhibitors, delavirdine, fluconazole, imatinib, voriconazole)
Decrease: primidone effect—CYP3A4 inducers (barbiturates, carBAMazepine, efavirenz, phenytoins, nevirapine)

Drug/Herb

- Avoid use with kava, St. John's wort, valerian

Increase: effect—ginkgo
Decrease: effect—ginseng, santonica

NURSING CONSIDERATIONS

Assess:

- **Seizures:** location, duration, type; folic acid deficiency; fatigue, weakness, neuropathy, depression
- Product level: therapeutic level 5-15 mcg/ml; CBC, LFTs should be obtained q6mo

⚠ Mental status: mood, sensorium, affect, memory (long, short), suicidal thoughts/behaviors

- Respiratory depression, wheezing
- Blood dyscrasias: fever, sore throat, bruising, rash, jaundice

Evaluate:

- Therapeutic response: decreased seizures

Teach patient/family:

- Not to withdraw product quickly because withdrawal symptoms may occur
- To avoid hazardous activities until stabilized on product because drowsiness, dizziness may occur
- To carry emergency ID with condition, medication listed
- To recognize signs of blood dyscrasias; about when to notify prescriber
- To avoid alcohol
- **Contraception:** Use additional contraceptive during and for 1 mo after therapy, contraceptive may be reduced

probenecid (Rx)

(proe-ben'e-sid)
Func. class.: Uricosuric, antigout agent
Chem. class.: Sulfonamide derivative

ACTION: Inhibits tubular reabsorption of urates, with increased excretion of uric acids

USES: Hyperuricemia in gout, gouty arthritis, adjunct to penicillin treatment

CONTRAINDICATIONS: Hypersensitivity, severe renal/hepatic disease, CCr <50 mg/min, history of uric acid calculus
Precautions: Pregnancy (C), children <2 yr, sulfonamide hypersensitivity, pepticular

DOSAGE AND ROUTES

Adjunct to penicillin

- **Adult/adolescent >15 yr, >50 kg (110 lb): PO** 500 mg qid

Gout/gouty arthritis
- **Adult:** PO 250 mg bid for 1 wk, then 500 mg bid, max 2 g/day; maintenance 500 mg/day × 6 mo

Adjunct in penicillin treatment
- **Adult and adolescent >50 kg: PO** 500 mg qid
- **Child <50 kg: PO** 25 mg/kg, then 40 mg/kg in divided doses qid

Renal dose
- Avoid use if CCr <50 ml/min

Available forms: Tabs 500 mg

Administer:
- After meals or with milk if GI symptoms occur
- Increase fluid intake to 2-3 L/day to prevent urinary calculi

SIDE EFFECTS

CNS: Drowsiness, headache, flushing
CV: Bradycardia
GI: *Gastric irritation, nausea, vomiting, anorexia,* hepatic necrosis
GU: Glycosuria, thirst, frequency, nephrotic syndrome
INTEG: Rash, dermatitis, pruritus, fever
META: *Acidosis, hypokalemia, hyperchloremia,* hyperglycemia
RESP: Apnea, irregular respirations

PHARMACOKINETICS

Peak 2-4 hr, duration 8 hr, half-life 5-8 hr; metabolized by liver; excreted in urine

INTERACTIONS

Increase: effect of acyclovir, barbiturates, allopurinol, benzodiazepines, dyphylline, zidovudine, cephalosporins, penicillins, sulfonamides
Increase: toxicity—sulfa products, dapsone, clofibrate, indomethacin, rifampin, naproxen, methotrexate
Decrease: action of probenecid—salicylates

Drug/Lab Test
Increase: theophylline levels

NURSING CONSIDERATIONS

Assess:
- Uric acid levels (3-7 mg/dl); mobility, joint pain, swelling
- Respiratory rate, rhythm, depth; notify prescriber of abnormalities
- Electrolytes; CO_2 before, during treatment
- Urine pH, output, glucose during beginning treatment

⚠ For CNS symptoms: confusion, twitching, hyperreflexia, stimulation, headache; may indicate overdose

Evaluate:
- Therapeutic response: absence of pain, stiffness in joints

Teach patient/family:
- To avoid OTC preparations (aspirin) unless directed by prescriber; increase water intake, avoid alcohol, caffeine

procainamide (Rx)

(proe-kane-ah'mide)
Func. class.: Antidysrhythmic (class IA)
Chem. class.: Procaine HCl amide analog

P

ACTION: Depresses excitability of cardiac muscle to electrical stimulation and slows conduction velocity in atrium, bundle of His, and ventricle; increases refractory period

USES: Life-threatening ventricular dysrhythmias
Unlabeled uses: Atrial fibrillation, flutter

CONTRAINDICATIONS: Hypersensitivity, severe heart block, torsades de pointes

Black Box Warning: Lupus erythematosus

Precautions: Pregnancy (C), breastfeeding, children, renal/hepatic disease, CHF, respiratory depression, cytopenia,

dysrhythmia associated with digoxin toxicity, myasthenia gravis, digoxin toxicity

Black Box Warning: Bone marrow failure, cardiac arrhythmias

DOSAGE AND ROUTES

Ventricular tachycardia during CPR

• **Adult: IV** loading dose 20 mg/min; either ventricular tachycardia resolves or patient becomes hypotensive; QRS complex is widened by 50% of original width or total is 17 mg/kg (1.2 g for a 70-kg patient); may give up to 50 mg/min in urgent situations; maintenance: 1-4 mg/min **CONT IV INF; IM** 50 mg/kg/day in divided doses q3-6hr

• **Child: IV** PALS 15 mg/kg over 30-60 min

Renal dose

• **Adult: IV** CCr 35-59 ml/min, give 70% maintenance dose; CCr 15-34 ml/min, give 40%-60% maintenance dose; CCr <15 ml/min, individualize dose

Available forms: Inj 100, 500 mg/ml

Administer:

IM route

• IM inj in deltoid; aspirate to avoid intravascular administration, use only when unable to use IV

Direct IV route

• Dilute each 100 mg/10 ml of 0.9% NaCl, give at max 50 mg/min

Intermittent IV INF route

• Dilute 0.2-1 g/50-500 ml of D_5W (2-4 mg/ml), give over 30-60 min at max 25-50 mg/min, use inf pump

Y-site compatibilities: Alfentanil, amikacin, aminocaproic acid, aminophylline, amiodarone, amphotericin B lipid complex, amphotericin B liposome, anidulafungin, ascorbic acid, atenolol, atracurium, atropine, aztreonam, benztropine, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, caspofungin, ceFAZolin, cefmetazole, cefonicid, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, ceftAZidime, ceftRIAXone, cefuroxime, cephalothin, chlorproMAZINE, cimetidine, cisatracurium, CISplatin, clindamycin, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, digoxin, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, doxacurium, DOXOrubicin, doxycycline, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, epoetin alfa, eptifibatide, ertapenem, erythromycin, esmolol, etoposide, etoposide phosphate, famotidine, fenoldopam, fentaNYL, fluconazole, fludarabine, fluorouracil, folic acid, furosemide, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, heparin, hydrocortisone, HYDROmorphone, IDArubicin, ifosfamide, indomethacin, insulin (regular), irinotecan, isoproterenol, ketorolac, labetalol, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, meperidine, metaraminol, methicillin, methotrexate, methoxamine, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, mezlocillin, miconazole, midazolam, mitoXANtrone, morphine, moxalactam, multivitamins, mycophenolate, nafcillin, nalbuphine, naloxone, netilmicin, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxacillin, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pamidronate, pancuronium, pantoprazole, papaverine, PEMEtrexed, penicillin G potassium/sodium, pentamidine, pentazocine, PENTobarbital, PHENobarbital, phenylephrine, phytonadione, piperacillin, piperacillin-tazobactam, polymyxin B, potassium chloride, prochlorperazine, promethazine, propranolol, protamine, pyridoxine, quiNIDine, quinupristin-dalfopristin, ranitidine, remifentanil, ritodrine, rocuronium, sodium bicarbonate, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiamine, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, tobramycin, tolazoline, trimetaphan, urokinase, vancomycin, vasopressin, vecuronium, verapamil, vinCRIStine,

vinorelbine, vitamin B complex/C, voriconazole, zoledronic acid

SIDE EFFECTS

CNS: *Headache, dizziness,* confusion, psychosis, restlessness, irritability, weakness, depression
CV: *Hypotension,* heart block, cardiovascular collapse, arrest, torsades de pointes
GI: Nausea, vomiting, anorexia, diarrhea, hepatomegaly, pain, bitter taste
HEMA: SLE syndrome, agranulocytosis, thrombocytopenia, neutropenia, hemolytic anemia
INTEG: Rash, urticaria, edema, swelling (rare), pruritus, flushing, angioedema
SYST: SLE

PHARMACOKINETICS

Metabolized in liver to active metabolites, excreted unchanged by kidneys (60%), protein binding 15%
IM: Peak 10-60 min, half-life 3 hr

INTERACTIONS

Increase: effects of neuromuscular blockers
Increase: procainamide effects—cimetidine, quiNIDine, trimethoprim, β-blockers, ranitidine
Increase: toxicity—other antidysrhythmics, thioridazine, quinolones
Drug/Lab Test
Increase: ALT, AST, alk phos, LDH, bilirubin

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Cardiac dysrhythmias: ECG continuously if using IV to determine increased PR or QRS segments; discontinue immediately; watch for increased ventricular ectopic beats, maximum need to rebolus

• Therapeutic blood levels, 4-10 mcg/ml or NAPA levels 10-20 mcg/ml

Black Box Warning: Bone marrow suppression: CBC q2wk × 3 mo; leukocyte, neutrophil, platelet counts may be decreased, treatment may need to be discontinued

• I&O ratio; electrolytes (K, Na, Cl), weight weekly, report gain of >2 lb
Toxicity: confusion, drowsiness, nausea, vomiting, tachydysrhythmias, oliguria
• ANA titer; during long-term treatment, watch for lupuslike symptoms
• Cardiac rate, rhythm, character, B/P continuously for fluctuations
• Respiratory status: rate, rhythm, character, lung fields; bilateral crackles may occur in CHF patient; watch for respiratory depression
CNS effects: dizziness, confusion, psychosis, paresthesias, seizures; product should be discontinued

Evaluate:

• Therapeutic response: decreased dysrhythmias

Teach patient/family:

• That wax matrix may appear in stools
• Not to discontinue without provider's approval

Black Box Warning: To notify prescriber immediately if lupuslike symptoms appear (joint pain, butterfly rash, fever, chills, dyspnea)

Black Box Warning: To notify prescriber of leukopenia (sore mouth, gums, throat) or thrombocytopenia (bleeding, bruising)

• How to take pulse and when to report to prescriber
• To avoid driving, other hazardous activities until product effect is known

TREATMENT OF OVERDOSE:

O_2, artificial ventilation, ECG, administer DOPamine for circulatory depression, diazepam or thiopental for seizures, isoproterenol

P

procarbazine (Rx)

(proe-kar'ba-zeen)

Matulane

Func. class.: Antineoplastic, alkylating agent

Chem. class.: Hydrazine derivative

ACTION: Inhibits DNA, RNA, protein synthesis; has multiple sites of action; nonvesicant

USES: Lymphoma, Hodgkin's disease, cancers resistant to other therapy

Unlabeled uses: Brain, lung malignancies; other lymphomas; multiple myeloma, malignant melanoma, polycythemia vera

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, hypersensitivity, thrombocytopenia, bone marrow depression

Precautions: Cardiac/renal/hepatic disease, radiation therapy, seizure disorder, anemia, bipolar disorder, Parkinson's disease

Black Box Warning: Requires a specialized care setting and an experienced clinician

DOSAGE AND ROUTES

- **Adult: PO** 2-4 mg/kg/day for 1st wk; maintain dosage of 4-6 mg/kg/day until platelets, WBC fall; after recovery, 1-2 mg/kg/day
- **Child: PO** 50 mg/m²/day for 7 days then 100 mg/m² until desired response, leukopenia, or thrombocytopenia occurs; 50 mg/m²/day maintenance after bone marrow recovery

Available forms: Caps 50 mg

Administer:

- In divided doses and at bedtime to minimize nausea and vomiting
- Nonphenothiazine antiemetic 30-60 min before product and 4-10 hr after treatment to prevent vomiting

SIDE EFFECTS

CNS: Headache, dizziness, insomnia, hallucinations, confusion, coma, pain, chills, fever, sweating, paresthesias, seizures, peripheral neuropathy

EENT: Retinal hemorrhage, nystagmus, photophobia, diplopia, dry eyes

GI: *Nausea, vomiting,* anorexia, diarrhea, constipation, dry mouth, stomatitis, elevated hepatic enzymes

GU: Azoospermia, cessation of menses

HEMA: Thrombocytopenia, anemia, leukopenia, myelosuppression, bleeding tendencies, purpura, petechiae, epistaxis, hemolysis

INTEG: *Rash,* pruritus, dermatitis, alopecia, herpes, hyperpigmentation

MS: Arthralgias, myalgias

RESP: Cough, pneumonitis, hemoptysis

SYST: Secondary malignancy

PHARMACOKINETICS

Half-life 1 hr; concentrates in liver, kidney, skin; metabolized in liver, excreted in urine

INTERACTIONS

⚠ **Increase:** hypotension—meperidine; do not use together

Increase: neuroleptic malignant syndrome, seizures, hyperpyrexia—alcohol, MAOIs, tricyclics, sympathomimetic products, SSRIs, SNRIs

Increase: hypertension—guanethidine, levodopa, methyldopa, reserpine, caffeine

⚠ Life-threatening hypertension: sympathomimetics

Increase: bleeding risk—NSAIDs, anticoagulants, platelet inhibitors, thrombolytics

Increase: CNS depression—barbiturates, antihistamines, opioids, hypotensive agents, phenothiazines

Drug/Food

- Hypertensive crisis: tyramine foods

NURSING CONSIDERATIONS

Assess:

- **Bone marrow suppression:** CBC, differential, platelet count weekly; withhold product if WBC is $<4000/mm^3$ or platelet count is $<100,000/mm^3$; notify prescriber
- **Hepatic/renal disease:** can cause accumulation of drug, increased toxicity; renal studies: BUN; serum uric acid; urine CCr; electrolytes before, during therapy; I&O ratio, report fall in urine output to <30 ml/hr; hepatic studies before, during therapy: bilirubin, AST, ALT, alk phos, LDH prn or monthly
- Monitor temp; fever may indicate beginning infection

Black Box Warning: To be used only in a specialized care setting with emergency equipment

Black Box Warning: To be given only by an experienced clinician knowledgeable in cytotoxic products

- CNS changes: confusion, paresthesias, neuropathies; product should be discontinued

⚠ Tyramine foods in diet; hypertensive crisis can occur

⚠ **Toxicity:** facial flushing, epistaxis, increased PT, thrombocytopenia; product should be discontinued

- **Bleeding:** hematuria, guaiac stools, bruising or petechiae, mucosa or orifices q8hr
- Effects of alopecia on body image; discuss feelings about body changes
- Jaundiced skin, sclera; dark urine, clay-colored stools, itchy skin, abdominal pain, fever, diarrhea
- Buccal cavity for dryness, sores or ulceration, white patches, oral pain, bleeding, dysphagia
- GI symptoms: frequency of stools, cramping
- **Acidosis, signs of dehydration:** rapid respirations, poor skin turgor, decreased urine output, dry skin, restlessness, weakness

Evaluate:

- Therapeutic response: decreasing malignancy

Teach patient/family:

- To report any complaints, side effects to nurse or prescriber: CNS changes, diarrhea, cough, SOB, fever, chills, sore throat, bleeding, bruising, vomiting blood; black, tarry stools
- That hair may be lost during treatment and wig or hairpiece may make patient feel better; that new hair may be different in color, texture
- To avoid sunlight or UV exposure; to wear sunscreen or protective clothing
- To avoid foods with citric acid, hot or rough texture
- To report any bleeding, white spots, ulcerations in mouth to prescriber; to examine mouth daily
- To avoid driving, activities requiring alertness because dizziness may occur
- To use effective contraception; to avoid breastfeeding; that product may cause infertility
- To avoid the ingestion of alcohol, caffeine, tyramine-containing foods; that cold, hay fever, and weight-reducing products may cause serious product interactions; to avoid smoking
- To avoid crowds, persons with infections if granulocytes are low
- To avoid vaccines

P

prochlorperazine (Rx)

(proe-klor-pair'a-zeen)

Compro

Func. class.: Antiemetic, antipsychotic

Chem. class.: Phenothiazine, piperazine derivative

Do not confuse:

prochlorperazine/chlorproMAZINE

ACTION: Decreases dopamine neurotransmission by increasing dopamine turnover through the blockade of the D_2 somatodendritic autoreceptor in the mesolimbic system

USES: Nausea, vomiting, psychotic disorders
Unlabeled uses: Migraine

CONTRAINDICATIONS: Hypersensitivity to phenothiazines, coma; infants, neonates, children <2 yr or <20 lb; surgery
Precautions: Pregnancy (C), breastfeeding, geriatric patients, seizure, encephalopathy, glaucoma, hepatic disease, Parkinson's disease, BPH

Black Box Warning: Increased mortality in elderly patients with dementia-related psychosis

DOSAGE AND ROUTES

Postoperative nausea/vomiting
- **Adult: IM** 5-10 mg 1-2 hr before anesthesia; may repeat after 30 min; **IV** 5-10 mg 15-30 min before anesthesia; **IV INF** 20 mg/L D_5W or **NS** 15-30 min before anesthesia, max 40 mg/day

Severe nausea/vomiting
- **Adult: PO** 5-10 mg tid-qid; **SUS REL** 15 mg/day in AM or 10 mg q12hr; **RECT** 25 mg/bid; **IM** 5-10 mg q3-4hr prn, max 40 mg/day
- **Child 18-39 kg: PO** 2.5 mg tid or 5 mg bid; **IM** 0.132 mg/kg q3-4hr prn, max 15 mg/day
- **Child 14-17 kg: PO/RECT** 2.5 mg bid-tid; **IM** 0.132 mg/kg q3-4hr prn, max 10 mg/day
- **Child 9-13 kg: PO/RECT** 2.5 mg/day-bid; **IM** 0.132 mg/kg q3-4hr prn, max 7.5 mg/day

Antipsychotic
- **Adult and child ≥12 yr: PO** 5-10 mg tid-qid; may increase q2-3days, max 150 mg/day; **IM** 10-20 mg q2-4hr up to 4 doses then 10-20 mg q4-6hr
- **Child 2-12 yr: PO** 2.5 mg bid-tid; **IM** 0.132 mg/kg change to oral ASAP

Antianxiety
- **Adult and child ≥12 yr: PO** 5 mg tid-qid, max 20 mg/day
- **Child 2-12 yr: IM** 0.132 mg/kg change to oral ASAP

Available forms: Tabs 5, 10 mg; supp 25 mg
Administer:
- Avoid other CNS depressants

IM route
- IM inj in large muscle mass; aspirate to avoid IV administration
- Keep patient recumbent for ½ hr

Direct IV route
- No dilution needed, inject directly in a vein ≤5 mg/min, do not give as bolus

Intermittent IV INF route
- May dilute 20 mg/L NaCl and give as inf 15-30 min before anesthesia induction

Syringe compatibilities: Atropine, butorphanol, chlorproMAZINE, cimetidine, diamorphine, diphenhydrAMINE, droperidol, fentaNYL, glycopyrrolate, hydrOXYzine, meperidine, metoclopramide, nalbuphine, pentazocine, perphenazine, promazine, promethazine, ranitidine, scopolamine, SUFentanil
Y-site compatibilities: Amsacrine, calcium gluconate, cisatracurium, CISplatin, cladribine, cyclophosphamide, cytarabine, DOXOrubicin, DOXOrubicin liposome, fluconazole, granisetron, heparin, hydrocortisone, melphalan, methotrexate, ondansetron, PACLitaxel, potassium chloride, propofol, remifentanil, sargramostim, SUFentanil, teniposide, thiotepa, vinorelbine, vit B/C

SIDE EFFECTS

CNS: Neuroleptic malignant syndrome, *extrapyramidal reactions, tardive dyskinesia, euphoria,* depression, *drowsiness,* restlessness, tremor, dizziness, headache
CV: Circulatory failure, tachycardia, hypotension, ECG changes
EENT: Blurred vision
GI: Nausea, vomiting, anorexia, dry mouth, diarrhea, constipation, weight loss, metallic taste, cramps
HEMA: Agranulocytosis
MISC: Impotence
RESP: Respiratory depression

PHARMACOKINETICS

Metabolized by liver; excreted in urine, breast milk; crosses placenta; 91%-99% protein binding
PO: Onset 30-40 min, duration 3-4 hr
RECT: Onset 60 min, duration 3-4 hr
IM: Onset 10-20 min, duration 4-6 hr; children: 12 hr

INTERACTIONS

Increase: anticholinergic action—anticholinergics, antiparkinson products, antidepressants
Increase: CNS depression—CNS depressants
Increase: serotonin syndrome, neuroleptic malignant syndrome—SSRIs, SNRIs
Decrease: prochlorperazine effect—barbiturates, antacids, lithium
Drug/Herb
Increase: CNS depression—chamomile, hops, kava, St. John's wort, valerian
Increase: EPS—kava
Drug/Lab Test
Increase: LFTs, cardiac enzymes, cholesterol, blood glucose, prolactin, bilirubin, PBI, ^{131}I, alk phos, leukocytes, granulocytes, platelets
Decrease: hormones (blood and urine)
False positive: pregnancy tests, urine bilirubin
False negative: urinary steroids, 17-OHCS, pregnancy tests

NURSING CONSIDERATIONS

Assess:
• **EPS:** abnormal movement, tardive dyskinesia, akathisia
• VS, B/P; check patients with cardiac disease more often
⚠ **Neuroleptic malignant syndrome:** seizures, hypo/hypertension, fever, tachycardia, dyspnea, fatigue, muscle stiffness, loss of bladder control; notify prescriber immediately
⚠ CBC, LFTs during course of treatment; blood dyscrasias, hepatotoxicity may occur
• Respiratory status before, during, after administration of emetic; check rate, rhythm, character; respiratory depression can occur rapidly among geriatric or debilitated patients
Evaluate:
• Therapeutic response: absence of nausea, vomiting; reduced anxiety, agitation, excitability
Teach patient/family:
• To avoid hazardous activities, activities requiring alertness because dizziness may occur
• To avoid alcohol
• Not to double or skip doses
• That urine may be pink to reddish brown
• That suppositories may contain coconut/palm oil
• To report dark urine, clay-colored stools, bleeding, bruising, rash, blurred vision
• To avoid sun; wear sunscreen, protective clothing

progesterone (Rx)

(proe-jess'ter-one)
Crinone, Endometrin, First-Progesterone, Prochieve, Prometrium
Func. class.: Progestogen
Chem. class.: Progesterone derivative

P

ACTION: Inhibits secretion of pituitary gonadotropins, which prevents follicular maturation, ovulation; stimulates growth of mammary tissue; antineoplastic action against endometrial cancer

USES: Contraception, amenorrhea, premenstrual syndrome, abnormal uterine bleeding, endometrial hyperplasia prevention, assisted reproductive technology (ART) gel
Unlabeled uses: Corpus luteum insufficiency, early pregnancy failure, PMS, preterm delivery prophylaxis

CONTRAINDICATIONS: Pregnancy (B), ectopic pregnancy; hypersen-

sitivity to this product, peanuts, or peanut oil; thromboembolic disorders, reproductive cancer, genital bleeding (abnormal, undiagnosed), cerebral hemorrhage, PID, STDs, thrombophlebitis

Black Box Warning: Breast cancer

Precautions: Breastfeeding, hypertension, asthma, blood dyscrasias, CHF, diabetes mellitus, bone disease, depression, migraine headache, seizure disorders, gallbladder/renal/hepatic disease, family history of breast/reproductive tract cancer

Black Box Warning: Cardiac disease, dementia

DOSAGE AND ROUTES

Infertility

• **Adult: VAG** 90 mg/day (micronized gel); 100 mg 2-3 times/day starting day after oocyte retrieval and for ≤10 wk total (insert)

Amenorrhea/functional uterine bleeding

• **Adult: IM** 5-10 mg/day × 6-8 doses

Endometrial hyperplasia prevention

• **Adult: PO** 200 mg/day × 12 days

Assisted reproductive therapy

• **Adult: GEL** 90 mg (8%) vaginally daily for supplementation; 90 mg (8%) vaginally bid for replacement; if pregnancy occurs, continue × 10-12 wk

Corpus luteum insufficiency (unlabeled)

• **Adult: VAG INSERT** 90-100 mg bid-tid starting at oocyte retrieval and continuing up to 10-12 wk gestation

Available forms: Inj 50 mg/ml; vag gel 4%, 8%; caps 100, 200 mg; vag insert 100 mg; vag supp 25, 100, 200, 500 mg; compounding kit 25, 50, 100, 200, 400 mg

Administer:

PO route

• Do not break, crush, or chew caps
• Titrated dose; use lowest effective dose
• In 1 dose in AM
• With food or milk to decrease GI symptoms
• Start progesterone 14 days after estrogen dose if given concomitantly

Vaginal route

• Wait at least 6 hr after any vaginal treatment before using vaginal gel

IM route

• Shake vial, inject deeply into large muscle, aspirate
• Check for particulate matter and discoloration before injecting

SIDE EFFECTS

CNS: *Dizziness, headache,* migraines, depression, *fatigue,* mood swings, dementia, drowsiness

CV: Hypotension, thrombophlebitis, edema, thromboembolism, stroke, pulmonary embolism, MI

EENT: Diplopia, retinal thrombosis

GI: *Nausea,* vomiting, anorexia, cramps, increased weight, cholestatic jaundice, *constipation,* abdominal pain

GU: Amenorrhea, cervical erosion, breakthrough bleeding, dysmenorrhea, vaginal candidiasis, nocturia, breast changes, *gynecomastia, testicular atrophy, impotence,* endometriosis, spontaneous abortion, breast pain, ectopic pregnancy

INTEG: Rash, urticaria, acne, hirsutism, alopecia, oily skin, seborrhea, purpura, melasma

META: Hyperglycemia

SYST: Angioedema, anaphylaxis

PHARMACOKINETICS

Excreted in urine, feces; metabolized in liver

IM/RECT/VAG: Duration 24 hr

INTERACTIONS

Increase: progesterone effect—CYP3A4 inhibitors (ketoconazole, cimetidine, clarithromycin, danazol, diltiazem, erythromycin, fluconazole, itraconazole, troleandomycin, verapamil, voriconazole)

Decrease: progesterone effect—barbiturates, phenytoin

Drug/Lab Test
Increase: alk phos, nitrogen (urine), pregnanediol, amino acids, factors VII, VIII, IX, X
Decrease: GTT, HDL

NURSING CONSIDERATIONS

Assess:
- **Abnormal uterine bleeding:** vaginal bleeding; obtain pad count, patient menstrual history, breast exam, cervical cytology
- Weight daily; notify prescriber of weekly weight gain of >5 lb
- B/P at beginning of treatment and periodically
- I&O ratio; be alert for decreasing urinary output, increasing edema
- Hepatic studies: ALT, AST, bilirubin periodically during long-term therapy
- Edema, hypertension, cardiac symptoms, jaundice, thromboembolism
- Mental status: affect, mood, behavioral changes, depression
- Hypercalcemia

Perform/provide:
- Storage in dark area

Evaluate:
- Therapeutic response: decreased abnormal uterine bleeding, absence of amenorrhea

Teach patient/family:
- ⚠ To report breast lumps, vaginal bleeding, edema, jaundice, dark urine, clay-colored stools, dyspnea, headache, blurred vision, abdominal pain, numbness or stiffness in legs, chest pain
- To avoid gel with other vaginal products; if to be used together, to separate by ≥6 hr; for vaginal route, on proper insertion technique
- To report suspected pregnancy
- To monitor blood glucose if diabetic
- To avoid activities requiring mental alertness until effects are realized, can cause dizziness

promethazine (Rx)

(proe-meth'a-zeen)
Phenadoz, Phenergan, Promethagan
Func. class.: Antihistamine, H_1-receptor antagonist, antiemetic
Chem. class.: Phenothiazine derivative

Do not confuse:
Phenergan/Theragran

ACTION: Acts on blood vessels, GI, respiratory system by competing with histamine for H_1-receptor sites; decreases allergic response by blocking histamine

USES: Motion sickness, rhinitis, allergy symptoms, sedation, nausea, preoperative and postoperative sedation
Unlabeled uses: Allergic rhinitis, acute peripheral vestibular nystagmus, hyperemesis gravidarum

CONTRAINDICATIONS: Hypersensitivity, breastfeeding, agranulocytosis, bone marrow suppression, coma, jaundice, Reye's syndrome

Black Box Warning: Infants, neonates, children, intraarterial/SUBCUT administration, extravasation

Precautions: Pregnancy (C), cardiac/renal/hepatic disease, asthma, seizure disorder, prostatic hypertrophy, bladder obstruction, glaucoma, COPD, GI obstruction, ileus, CNS depression, diabetes, sleep apnea, urinary retention

Black Box Warning: IV use

DOSAGE AND ROUTES

Nausea/vomiting
- **Adult: PO/IM/IV/RECT** 12.5-25 mg; q4-6hr prn
- **Child >2 yr: PO/IM/IV/RECT** 0.25-0.5 mg/kg q4-6hr prn

Motion sickness
- **Adult: PO** 25 mg bid, give ½-1 hr before departure then q8-12hr prn

• **Child ≥2 yr: PO/IM/RECT** 12.5-25 mg bid, give ½-1 hr before departure then q8-12hr prn

Sedation

• **Adult: PO/IM** 25-50 mg at bedtime

• **Child ≥2 yr: PO/IM/RECT** 12.5-25 mg at bedtime

Sedation (preoperative/postoperative)

• **Adult: PO/IM/IV** 25-50 mg

• **Child >2 yr: PO/IM/IV** 0.5-1.1 mg/kg

Allergy/rhinitis (unlabeled)

• **Adult: PO** 12.5 mg qid or 25 mg at bedtime

• **Child ≥2 yr: PO** 6.25-12.5 mg tid or 25 mg at bedtime

Hyperemesis gravidarum (unlabeled)

• **Pregnant females: PO/RECT/IM/IV** 12.5-25 mg q4hr

Nystagmus (unlabeled)

• **Adult: PO** 12.5-25 mg q4-6hr for ≤48 hr

Available forms: Tabs 12.5, 25, 50 mg; supp 12.5, 25, 50 mg; inj 25, 50 mg/ml

Administer:

• Avoid use with other CNS depressants

PO route

• With meals for GI symptoms; absorption may slightly decrease

• When used for motion sickness, 30 min-1 hr before travel

IM route

• IM inj deep in large muscle; rotate site

Direct IV route

Black Box Warning: Check for extravasation: burning, pain, swelling at IV site; can cause tissue necrosis

• Do not use if precipitate is present

• Rapid administration may cause transient decrease in B/P

• After diluting each 25-50 mg/9 ml of NaCl for inj; give ≤25 mg/2 min

Syringe compatibilities: Butorphanol, chlorproMAZINE, cimetidine, dihydroergotamine, diphenhyDRAMINE, droperidol, fentaNYL, glycopyrrolate, HYDROmorphone, hydrOXYzine, meperidine, metoclopramide, midazolam, pentazocine, perphenazine, prochlorperazine, promazine, ranitidine, scopolamine

Y-site compatibilities: Alfentanil, amifostine, amikacin, aminocaproic acid, amsacrine, anidulafungin, ascorbic acid, atenolol, atracurium, atropine, aztreonam, benztropine, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, caspofungin, chlorproMAZINE, cimetidine, ciprofloxacin, cisatracurium, CISplatin, cladribine, codeine, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexmedetomidine, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, doxacurium, DOXOrubicin, doxycycline, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, epoetin, eptifibatide, erythromycin, esmolol, etoposide, famotidine, fenoldopam, fentaNYL, filgrastim, fluconazole, fludarabine, gemcitabine, gentamicin, glycopyrrolate, granisetron, HYDROmorphone, hydrOXYzine, IDArubicin, ifosfamide, insulin (regular), irinotecan, isoproterenol, labetalol, levofloxacin, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, melphalan, meperidine, metaraminol, methoxamine, methyldopate, metoclopramide, metoprolol, metroNIDAZOLE, miconazole, midazolam, milrinone, mitoXANtrone, morphine, mycophenolate, nalbuphine, naloxone, netilmicin, nitroglycerin, norepinephrine, octreotide, ondansetron, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pamidronate, pancuronium, PEMEtrexed, pentamidine, pentazocine, phenylephrine, polymyxin B, procainamide, prochlorperazine, propranolol, protamine, pyridoxine, quiNIDine, quinupristin-dalfopristin, ranitidine, remifentanil, Ringer's, ritodrine, riTUXimab, rocuronium, sargramostim, sodium acetate, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiamine, thiotepa, tigecycline, tirofiban, TNA, tobramycin, tolazoline, trastuzumab, trimetaphan, vancomycin, vasopressin,

vecuronium, verapamil, vinCRIStine, vinorelbine, voriconazole

SIDE EFFECTS

CNS: *Dizziness, drowsiness,* poor coordination, fatigue, anxiety, euphoria, confusion, paresthesia, neuritis, EPS, neuroleptic malignant syndrome
CV: Hypo/hypertension, palpitations, tachycardia
EENT: Blurred vision, dilated pupils, tinnitus, nasal stuffiness; dry nose, throat, mouth; photosensitivity
GI: *Constipation,* dry mouth, nausea, vomiting, anorexia, diarrhea
GU: *Urinary retention,* dysuria, frequency
HEMA: Thrombocytopenia, agranulocytosis, hemolytic anemia
INTEG: Rash, urticaria, photosensitivity
RESP: Increased thick secretions, wheezing, chest tightness; apnea in neonates, infants, young children

PHARMACOKINETICS

Metabolized in liver; excreted by kidneys, GI tract (inactive metabolites)
PO: Onset 20 min, duration 4-12 hr
IV: Onset 3-5 min

INTERACTIONS

Increase: CNS depression—barbiturates, opioids, hypnotics, tricyclics, alcohol
Increase: promethazine effect—MAOIs
Decrease: oral anticoagulants effect—heparin

Drug/Lab Test

False negative: skin allergy test
False positive: urine pregnancy test
Interference: blood grouping (ABO), GTT

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Not to be used in children <2 yr, fatal respiratory depression may occur; use cautiously in children >2 yr, seizures, paradoxical CNS stimulation may occur

- **Antiemetic/motion sickness:** nausea, vomiting before, after dose
- I&O ratio; be alert for urinary retention, frequency, dysuria; product should be discontinued

⚠ CBC with differential, LFTs during long-term therapy; blood dyscrasias, jaundice may occur

- Respiratory status: rate, rhythm, increase in bronchial secretions, wheezing, chest tightness
- Cardiac status: palpitations, increased pulse, hypo/hypertension, B/P in those receiving IV doses
- **Neuroleptic malignant syndrome:** fever, confusion, diaphoresis, rigid muscles, elevated CPK, encephalopathy; discontinue product, notify prescriber

Perform/provide:

- Hard candy, gum, frequent rinsing of mouth for dryness
- Storage in tight, light-resistant container

Evaluate:

- Therapeutic response: absence of running, congested nose; rashes; absence of motion sickness, nausea; sedation

Teach patient/family:

- That product may cause photosensitivity; to avoid prolonged exposure to sunlight
- To notify prescriber of confusion, sedation, hypotension, jaundice, fever
- To avoid driving, other hazardous activity if drowsy
- To avoid concurrent use of alcohol or other CNS depressants
- That product may reduce sweating; that there is a risk of heat stroke
- How to use frequent sips of water, gum to decrease dry mouth

P

propafenone (Rx)

(pro-paff'e-nown)

Rythmol, Rythmol SR

Func. class.: Antidysrhythmic (class IC)

ACTION: Slows conduction velocity; reduces membrane responsiveness; inhibits automaticity; increases ratio of effective refractory period to action potential duration; β-blocking activity

USES: Sustained ventricular tachycardia, atrial fibrillation (single dose), paroxysmal supraventricular tachycardia (PSVT) prophylaxis, supraventricular dysrhythmias

Unlabeled uses: Wolff-Parkinson-White (WPW) syndrome

CONTRAINDICATIONS: 2nd/3rd-degree AV block, right bundle branch block, cardiogenic shock, hypersensitivity, bradycardia, uncontrolled CHF, sick-sinus syndrome, marked hypotension, bronchospastic disorders, electrolyte imbalance

Precautions: Pregnancy (C), breast-feeding, children, geriatric patients, CHF, hypo/hyperkalemia, nonallergic bronchospasm, renal/hepatic disease, hematologic disorders, myasthenia gravis

Black Box Warning: Recent MI, cardiac arrhythmias, QT prolongation, torsades de pointes

DOSAGE AND ROUTES

- **Adult: PO** 150 mg q8hr; allow 3-4 day interval before increasing dose, max 900 mg/day

Atrial fibrillation

- **Adult: PO** 450 or 600 mg as single dose; SR 225 mg q12hr, may increase to 325 q12hr, max 425 mg q12hr

Available forms: Tabs 150, 225, 300 mg; SR cap 225, 325, 425 mg

Administer:

- Do not break, crush, or chew tabs; swallow whole
- To hospitalized patients because heart monitoring is required
- After hypo/hyperkalemia is corrected
- With dosage adjustment q3-4days
- Without regard to meals

SIDE EFFECTS

CNS: Headache, dizziness, abnormal dreams, syncope, confusion, seizures, insomnia, tremor, anxiety, fatigue

CV: Supraventricular dysrhythmia, ventricular dysrhythmia, bradycardia, prodysrhythmia, palpitations, AV block, intraventricular conduction delay, AV dissociation, hypotension, chest pain, asystole

EENT: Blurred vision, altered taste, tinnitus

GI: *Nausea, vomiting,* constipation, dyspepsia, cholestasis, abnormal hepatic studies, dry mouth, diarrhea, anorexia

HEMA: Leukopenia, agranulocytosis, granulocytopenia, thrombocytopenia, anemia, bruising

INTEG: Rash

RESP: Dyspnea

PHARMACOKINETICS

Peak 3-8 hr, half-life 2-10 hr; metabolized in liver; excreted in urine (metabolite)

INTERACTIONS

Increase: propafenone effects—CYP1A2, CYP2D6, CYP3A4 inhibitors (protease inhibitors, quiNINE, PARoxetine, saquinavir, erythromycin, azole antifungals, sertraline, tricyclics)

Increase: QT prolongation—other class IA/IC antidysrhythmics, arsenic trioxide, chloroquine, clarithromycin, droperidol, erythromycin, haloperidol, levomethadyl, methadone, pentamidine, chlorproMAZINE, mesoridazine, thioridazine

Increase: anticoagulation—warfarin

Increase: CNS effects—local anesthetics

Increase: digoxin level—digoxin

Increase: β-blocker effect—propranolol, metoprolol

Increase: cycloSPORINE levels—cycloSPORINE
Decrease: propafenone effect—rifampin, cimetidine, quiNIDine
Drug/Lab Test
Increase: CPK

NURSING CONSIDERATIONS

Assess:
• GI status: bowel pattern, number of stools

Black Box Warning: **QT/PR prolongation:** ECG or Holter monitor prior to and during therapy

Black Box Warning: **CHF:** dyspnea, jugular venous distention, crackles, edema in extremities, I&O ratio; check for decreasing output; daily weight

• CBC, ANA titer, LFTs
• Chest x-ray, pulmonary function test during treatment
• Lung fields; bilateral crackles, dyspnea, peripheral edema, weight gain; jugular venous distention may occur in patient with CHF
⚠ **Toxicity:** fine tremors, dizziness, hypotension, drowsiness, abnormal heart rate

Evaluate:
• Therapeutic response: absence of ventricular dysrhythmias; decreasing recurrence of PAF, PSVT

Teach patient/family:
• To avoid hazardous activities until response is known
• To report fever, chills, sore throat, bleeding, SOB, chest pain, palpitations, blurred vision
• To take tab with food
• To carry emergency ID identifying medication and prescriber
• To avoid abrupt discontinuation of product; to take as prescribed; not to miss, double doses

TREATMENT OF OVERDOSE:

O_2, artificial ventilation, defibrillation ECG; administer DOPamine for circulatory depression, diazepam or thiopental for seizures, isoproterenol

proparacaine ophthalmic

See Appendix B

⚠ *HIGH ALERT*

propofol (Rx)

(pro'poh-fole)
Diprivan, Fresenius Propoven
Func. class.: General anesthetic

ACTION: Produces dose-dependent CNS depression by activation of GABA receptor

USES: Induction or maintenance of anesthesia as part of balanced anesthetic technique; sedation in mechanically ventilated patients

CONTRAINDICATIONS: Hypersensitivity to this product or soybean oil, egg, benzyl alcohol (some products)
Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, respiratory depression, severe respiratory disorders, cardiac dysrhythmias, labor and delivery, renal disease, hyperlipidemia

DOSAGE AND ROUTES

Anesthesia
• **Adult <55 yr and ASA I/II IV (Diprivan or generic): IV** 40 mg q10sec until induction onset, maintenance 100-200 mcg/kg/min or **IV BOL** 20-50 mg prn, allow 3-5 min between adjustments; Fresenius Propoven 1% **IV** 20-40 q10sec until induction then 3-6 mg/kg/hr
• **Child ≥3 yr or ASA I or II: IV induction:** 2.5-3.5 mg/kg over 20-30 sec when not premedicated or lightly premedicated
• **Child 2 mo-16 yr maintenance: IV** 125-300 mcg/kg/min, lower dose for ASA III or **IV**

ICU sedation

• **Adult: IV** 5 mcg/kg/min over 5 min; may increase by 5-10 mcg/kg/min over 5-10 min until desired response (Diprivan or generic): 0.3-4 mg/kg/hr, max 4 mg/kg/hr (Fresenius Propoven)

Available forms: Inj 10 mg/ml in 20-ml ampule, 50-ml and 100-ml vials

Administer:

IV route

• Shake well before use; dilution is not necessary but, if diluted, use only D_5W to ≥2 mg/ml; give over 3-5 min, titrate to needed level of sedation; use only glass containers when mixing, not stable in plastic; use aseptic technique when transferring from original container

• **Fresenius Propoven 1%:** dilution is not necessary but, if diluted, use D_5W or NS to ≥2 mg/ml (max dilution max 1 part Fresenius Propoven/4 parts D_5W or NS); do not admix; lidocaine can be used to reduce pain at site

• May be given by cont inf; give by inf pump

• Only with resuscitative equipment available; only by qualified persons trained in anesthesia

Y-site compatibilities: Acyclovir, alfentanil, aminophylline, ampicillin, aztreonam, bumetanide, buprenorphine, butorphanol, calcium gluconate, CARBOplatin, ceFAZolin, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, ceftizoxime, cefTRIAXone, cefuroxime, chlorproMAZINE, cimetidine, CISplatin, clindamycin, cyclophosphamide, cycloSPORINE, cytarabine, dexamethasone, diphenhydrAMINE, DOBUTamine, DOPamine, doxycycline, droperidol, enalaprilat, ePHEDrine, EPINEPHrine, esmolol, famotidine, fentaNYL, fluconazole, fluorouracil, furosemide, ganciclovir, glycopyrrolate, granisetron, haloperidol, heparin, hydrocortisone, HYDROmorphone, hydrOXYzine, ifosfamide, imipenem/cilastatin, inamrinone, regular insulin, isoproterenol, ketamine, labetalol, levorphanol, lidocaine, LORazepam, magnesium sulfate, mannitol, meperidine, mezlocillin, miconazole, morphine, nafcillin, nalbuphine, naloxone, nitroglycerin, norepinephrine, ofloxacin, PACLitaxel, PENTobarbital, PHENobarbital, piperacillin, potassium chloride, prochlorperazine, propranolol, ranitidine, scopolamine, sodium bicarbonate, sodium nitroprusside, succinylcholine, SUFentanil, thiopental ticarcillin, ticarcillin/clavulanate, vecuronium, verapamil

Solution compatibilities: if given together via Y-site: D_5W, D_5LR, LR, D_5/0.45% NaCl, D_5/0.2% NaCl

SIDE EFFECTS

CNS: Involuntary movement, headache, jerking, fever, dizziness, shivering, tremor, confusion, somnolence, paresthesia, agitation, abnormal dreams, euphoria fatigue, increased intracranial pressure, impaired cerebral flow, seizures

CV: *Bradycardia, hypotension,* hypertension, PVC, PAC, tachycardia, abnormal ECG, ST segment depression, asystole, bradydysrhythmias

EENT: Blurred vision, tinnitus, eye pain, strange taste, diplopia

GI: *Nausea, vomiting, abdominal cramping,* dry mouth, swallowing, hypersalivation, pancreatitis

GU: Urine retention, green urine, cloudy urine, oliguria

INTEG: *Flushing, phlebitis, hives, burning/stinging at inj site,* rash, pain of extremities

MS: Myalgia

RESP: Apnea, *cough, hiccups,* dyspnea, hypoventilation, sneezing, wheezing, tachypnea, hypoxia, respiratory acidosis

SYST: Propofol infusion syndrome

PHARMACOKINETICS

Onset 15-30 sec, rapid distribution, half-life 1-8 min, terminal half-life 3-12 hr; 70% excreted in urine; metabolized in liver by conjugation to inactive metabolites, 95%-99% protein binding

INTERACTIONS

• Do not use within 10 days of MAOIs

Increase: CNS depression—alcohol, opioids, sedative/hypnotics, antipsychotics, skeletal muscle relaxants, inhalational anesthetics

Drug/Herb

Increase: propofol effect—St. John's wort

NURSING CONSIDERATIONS

Assess:

• Inj site: phlebitis, burning, stinging

• **ECG** for changes: PVC, PAC, ST segment changes; monitor VS

• **Neurologic excitatory symptoms:** movement, tremors, dizziness, LOC, pupil reaction

• Allergic reactions: hives

⚠ **Respiratory dysfunction:** respiratory depression, character, rate, rhythm; notify prescriber if respirations are <10/min

• **Propofol infusion syndrome:** rhabdomyolysis, renal failure, hyperkalemia, metabolic acidosis, cardiac dysrhythmias, heart failure usually between 35 and 93 hr after inf begun at >5 mg/kg/hr for >58 hr

Perform/provide:

• Storage in light-resistant area at room temp, use within 6 hr of opening

• If transferred from original container to another container, complete inf within 12 hr (Dipravan), 6 hr (generic propofol)

Evaluate:

• Therapeutic response: induction of anesthesia

Teach patient/family:

• That product will cause dizziness, drowsiness, sedation; to avoid hazardous activities until drug effect wears off

TREATMENT OF OVERDOSE:

Discontinue product; administer vasopressor agents or anticholinergics, artificial ventilation

propranolol (Rx)

(proe-pran'oh-lole)

Inderal, Inderal LA, InnoPran XL

Func. class.: Antihypertensive, antianginal, antidysrhythmic (class II)

Chem. class.: β-Adrenergic blocker

Do not confuse:

propranolol/Pravachol

Inderal/Toradol/Inderide/Adderall/Imuran

ACTION: Nonselective β-blocker with negative inotropic, chronotropic, dromotropic properties

USES: Chronic stable angina pectoris, hypertension, supraventricular dysrhythmias, migraine prophylaxis, pheochromocytoma, cyanotic spells related to hypertrophic subaortic stenosis

Unlabeled uses: Anxiety, Parkinson's tremor, prevention of variceal bleeding caused by portal hypertension, akathisia induced by antipsychotics, acute MI, portal hypertension, sclerodermal renal crisis, unstable angina, infantile capillary hemangioma, lithium-induced tremor

CONTRAINDICATIONS: Hypersensitivity to this product; cardiogenic shock, AV heart block; bronchospastic disease; sinus bradycardia; bronchospasm; asthma

Precautions: Pregnancy (C), breastfeeding, children, diabetes mellitus, hyperthyroidism, COPD, renal/hepatic disease, myasthenia gravis, peripheral vascular disease, hypotension, cardiac failure, Raynaud's disease, sick sinus syndrome, vasospastic angina, smoking, Wolff-Parkinson-White syndrome, thyrotoxicosis

Black Box Warning: Abrupt discontinuation

P

DOSAGE AND ROUTES

Dysrhythmias

• **Adult: PO** 10-30 mg tid-qid; **IV BOL** 1-3 mg give 1 mg/min; may repeat after 2 min, may repeat q4hr thereafter

• **Child: PO** 1 mg/kg/day in 2 divided doses; **IV** 0.01-0.1 mg/kg over 5 min

Hypertension

• **Adult: PO** 40 mg bid or 80 mg/day (ext rel) initially; usual dose 120-240 mg/day bid-tid or 120-160 mg/day (ext rel)

• **Child: PO** 0.5-1 mg/kg/day divided q6-12hr

Angina

• **Adult: PO** 10-20 mg bid-qid, increase at 3-7 day intervals up to 160-320 mg/day or 80 mg daily

MI prophylaxis

• **Adult: PO** 180-240 mg/day tid-qid starting 5 days to 2 wk after MI

Pheochromocytoma

• **Adult: PO** 60 mg/day × 3 days preoperatively in divided doses or 30 mg/day in divided doses (inoperable tumor)

Migraine

• **Adult: PO** 80 mg/day (ext rel) or in divided doses; may increase to 160-240 mg/day in divided doses

• **Child >35 kg (unlabeled): PO** 20-40 mg tid

• **Child ≤35 kg (unlabeled): PO** 10-20 mg tid

Essential tremor

• **Adult: PO** 40 mg bid; usual dose 120 mg/day

Acute MI (unlabeled)

• **Adult: PO** 180-320 mg/day in 3-4 divided doses

Anxiety (unlabeled)

• **Adult: PO** 10-80 mg given 1 hr prior to anxiety-producing event

Scleroderma renal crisis (unlabeled)

• **Adult: PO** 40 mg bid, may increase q3-7days, max 160-480 mg/day

Esophageal varices (portal hypertension) (unlabeled)

• **Adult: PO** 40 mg bid, titrate to heart rate reduction of 25%

Infantile capillary hemangioma (unlabeled)

• **Infant: PO** 2-3 mg/kg/day

Available forms: Ext rel caps 60, 80, 120, 160 mg; tabs 10, 20, 40, 60, 80, 90 mg; inj 1 mg/ml; oral sol 4 mg/ml, 8 mg/ml

Administer:

PO route

• Do not break, crush, chew, or open ext rel cap

• Do not use ext rel cap for essential tremor, MI, cardiac dysrhythmias; do not use InnoPran XL in hypertropic subaortic stenosis, migraine, angina pectoris

• Ext rel caps should be taken daily; InnoPran XL should be taken at bedtime

• May mix oral sol with liquid or semisolid food; rinse container to get entire dose

• With 8 oz water with food; food enhances bioavailability

• Do not give with aluminum-containing antacid; may decrease GI absorption

Direct IV route

• IV undiluted or diluted 10 ml D_5W for inj; give ≤1 mg/min

Intermittent IV INF route

• May be diluted in 50 ml NaCl and run 1 mg over 10-15 min

Y-site compatibilities: Acyclovir, alfentanil, alteplase, amikacin, aminocaproic acid, aminophylline, anidulafungin, ascorbic acid, atracurium, atropine, azaTHIOprine, aztreonam, benztropine, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, carmustine, caspofungin, cefamandole, cefAZolin, cefmetazole, cefonicid, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, cefTAZidime, ceftizoxime, cefTRIAXone, cefuroxime, cephalothin, cephapirin, chloramphenicol, chlorproMAZINE, cimetidine, CISplatin, clindamycin, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, doxacu-

rium, DOXOrubicin, doxycycline, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, epoetin alfa, eptifibatide, ertapenem, erythromycin, esmolol, etoposide, etoposide phosphate, famotidine, fenoldopam, fentaNYL, fluconazole, fludarabine, fluorouracil, folic acid, furosemide, ganciclovir, gatifloxacin, gemcitabine, gemtuzumab, gentamicin, glycopyrrolate, granisetron, heparin, hydrocortisone, HYDROmorphone, hydrOXYzine, IDArubicin, ifosfamide, imipenem-cilastatin, inamrinone, irinotecan, isoproterenol, ketorolac, labetalol, levofloxacin, lidocaine, linezolid, LORazepam, magnesium, mannitol, mechlorethamine, meperidine, metaraminol, methicillin, methotrexate, methoxamine, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, mezlocillin, miconazole, midazolam, milrinone, minocycline, mitoXANtrone, morphine, moxalactam, multiple vitamins, mycophenolate, nafcillin, nalbuphine, naloxone, nesiritide, netilmicin, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxacillin, oxaliplatin, oxytocin, palonosetron, pamidronate, pancuronium, papaverine, PEMEtrexed, penicillin G potassium/sodium, pentamidine, pentazocine, PENTobarbital, PHENobarbital, phenylephrine, phytonadione, piperacillin, polymyxin B, potassium chloride, procainamide, prochlorperazine, promethazine, propofol, protamine, pyridoxine, quiNIDine, quinupristin-dalfopristin, ranitidine, ritodrine, rocuronium, sodium acetate/bicarbonate, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiamine, thiotepa, ticarcillin, ticarcillin-clavulanate, tigecycline, tirofiban, tobramycin, tolazoline, trimetaphan, urokinase, vancomycin, vasopressin, vecuronium, verapamil, vinCRIStine, vinorelbine, vitamin B complex/C, voriconazole, zoledronic acid

SIDE EFFECTS

CNS: Depression, hallucinations, dizziness, *fatigue,* lethargy, paresthesias, bizarre dreams, disorientation

CV: Bradycardia, hypotension, CHF, palpitations, AV block, peripheral vascular insufficiency, vasodilation, cold extremities, pulmonary edema, dysrhythmias

EENT: Sore throat, laryngospasm, blurred vision, dry eyes

GI: Nausea, vomiting, diarrhea, colitis, constipation, cramps, dry mouth, hepatomegaly, gastric pain, acute pancreatitis

GU: Impotence, decreased libido, UTIs

HEMA: Agranulocytosis, thrombocytopenia

INTEG: Rash, pruritus, fever

META: Hyperglycemia, hypoglycemia

MISC: Facial swelling, weight change, Raynaud's phenomenon

MS: Joint pain, arthralgia, muscle cramps, pain

RESP: Dyspnea, respiratory dysfunction, *bronchospasm,* cough

PHARMACOKINETICS

Metabolized by liver; crosses placenta, blood-brain barrier; excreted in breast milk; protein binding 90%

PO: Onset 30 min, peak 1-1½ hr, duration 12 hr, half-life 3-8 hr

PO-ER: Peak 6 hr, duration 24 hr, half-life 8-11 hr

IV: Onset 2 min, peak 1 min, duration 5 min

INTERACTIONS

Increase: toxicity—phenothiazines

Increase: propranolol level—propafenone

Increase: effect of calcium channel blockers, neuromuscular blocker

Increase: negative inotropic effects—disopyramide

Increase: β-blocking effect—cimetidine

Increase: hypotension—quiNIDine, haloperidol, prazosin

Decrease: β-blocking effects—barbiturates

Decrease: propranolol levels—smoking

P

Drug/Herb
• Avoid use with feverfew
Increase: antihypertensive effect—hawthorn
Decrease: antihypertensive effect—ma huang
Drug/Lab Test
Increase: serum potassium, serum uric acid, ALT, AST, alk phos, LDH
Decrease: blood glucose
Interference: glaucoma testing

NURSING CONSIDERATIONS

Assess:

Black Box Warning: **Abrupt withdrawal:** taper over a few weeks, do not discontinue abruptly; dysrhythmias, angina, myocardial ischemia, or MI may occur, taper over at least a few weeks

• B/P, pulse, respirations during beginning therapy; notify prescriber if pulse <50 bpm or systolic B/P <90 mm Hg
⚠ **ECG** continuously if using as antidysrhythmic IV, PCWP (pulmonary capillary wedge pressure), CVP (central venous pressure)
• Hepatic enzymes: AST, ALT, bilirubin
• Angina pain: duration, time started, activity being performed, character
• Tolerance with long-term use
• Headache, lightheadedness, decreased B/P; may indicate need for decreased dosage; may aggrevate symptoms of arterial insufficiency
• **Fluid overload:** weight daily; report gain of >5 lb
⚠ I&O ratio, CCr if kidney damage is diagnosed; fatigue, weight gain, jugular distention, dyspnea, peripheral edema, crackles

Perform/provide:
• Protection from light

Evaluate:
• Therapeutic response: decreased B/P, dysrhythmias

Teach patient/family:
⚠ Not to discontinue abruptly; may precipitate life-threatening dysrhythmias, exacerbation of angina, MI; to take product at same time each day, either with or without food consistently; to decrease dosage over 2 wk
• To avoid OTC products unless approved by prescriber; to avoid alcohol
• To avoid hazardous activities if dizzy
• About the importance of compliance with complete medical regimen; to monitor blood glucose, may mask symptoms of hypoglycemia
• To make position changes slowly to prevent fainting
• That sensitivity to cold may occur
• How to take pulse, B/P; to withhold product if <50 bpm or systolic B/P <90 mm Hg

propylhexadrine nasal agent

See Appendix B

propylthiouracil (Rx)

(proe-pill-thye-oh-yoor'a-sill)
Propyl-Thyracil
Func. class.: Thyroid hormone antagonist (antithyroid)
Chem. class.: Thioamide

ACTION: Blocks synthesis peripherally of T_3, T_4 (triiodothyronine, thyroxine), inhibits organification of iodine

USES: Preparation for thyroidectomy, thyrotoxic crisis, hyperthyroidism, thyroid storm

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, hypersensitivity, agranulocytosis, hepatitis, jaundice
Precautions: Infants, bone marrow depression, fever

Black Box Warning: Hepatic disease

DOSAGE AND ROUTES

Thyrotoxic crisis
• **Adult and child: PO** 200-400 mg q4hr for 1st 24 hr

Preparation for thyroidectomy
- **Adult: PO** 600-1200 mg/day
- **Child: PO** 10 mg/kg/day in divided doses

Hyperthyroidism
- **Adult: PO** 100 mg tid increasing to 300 mg q8hr if condition is severe; continue to euthyroid state then 100 mg daily-tid
- **Child >6 yr: PO** 50 mg/day divided q8hr, titrate based on TSH/free T_4 levels
- **Neonate (unlabeled): PO** 5-10 mg/kg/day in divided doses q8hr

Available forms: Tabs 50 mg

Administer:
- With meals to decrease GI upset
- At same time each day to maintain product level
- At lowest dose that relieves symptoms

SIDE EFFECTS

CNS: *Drowsiness, headache, vertigo, fever,* paresthesias, neuritis

GI: *Nausea, diarrhea, vomiting,* jaundice, hepatitis, loss of taste, liver failure, death

GU: Nephritis

HEMA: Agranulocytosis, leukopenia, thrombocytopenia, hypothrombinemia, lymphadenopathy, bleeding, vasculitis, periarteritis

INTEG: *Rash, urticaria, pruritus, alopecia, hyperpigmentation,* lupuslike syndrome

MS: Myalgia, arthralgia, nocturnal muscle cramps, osteoporosis

PHARMACOKINETICS

Onset up to 3 wk, peak 6-10 wk, duration 1 wk to 1 mo, half-life 1-2 hr; excreted in urine, bile, breast milk; crosses placenta; concentration in thyroid gland

INTERACTIONS

- Bone marrow suppression: radiation, antineoplastics
- Agranulocytosis: phenothiazines

Increase: effects—potassium/sodium iodide, lithium

Decrease: anticoagulant effect—heparin, oral anticoagulants

Drug/Lab Test

Increase: PT, AST, ALT, alk phos

NURSING CONSIDERATIONS

Assess:
- **Hyperthyroidism:** weight loss, nervousness, insomnia, fever, diaphoresis, tremors; **hypothyroidism:** constipation, dry skin, weakness, headache; monitor T_3, T_4, which are increased; serum TSH, which is decreased; free thyroxine index, which is increased if dosage is too low; discontinue product 3-4 wk before RAIU
- Pulse, B/P, temp
- I&O ratio; check for edema: puffy hands, feet, periorbits; indicates hypothyroidism
- Weight daily; same clothing, scale, time of day

⚠ **Blood dyscrasias:** CBC with differential; leukopenia, thrombocytopenia, agranulocytosis

⚠ **Overdose:** peripheral edema, heat intolerance, diaphoresis, palpitations, dysrhythmias, severe tachycardia, increased temp, delirium, CNS irritability

⚠ **Hypersensitivity:** rash, enlarged cervical lymph nodes; product may have to be discontinued

- **Hypoprothrombinemia:** bleeding, petechiae, ecchymosis
- Clinical response: after 3 wk should include increased weight, pulse; decreased T_4
- **Bone marrow suppression:** sore throat, fever, fatigue

Black Box Warning: Hepatotoxicity: LFTs before, during treatment; jaundice, nausea, vomiting, abdominal pain, anorexia, diarrhea, fatigue

Perform/provide:
- Storage in light-resistant container
- Fluids to 3-4 L/day unless contraindicated

P

Evaluate:
• Therapeutic response: weight gain, decreased pulse, decreased T_4, decreased B/P

Teach patient/family:
• To abstain from breastfeeding after delivery
• To take pulse daily
• To report redness, swelling, sore throat, mouth lesions, which indicate blood dyscrasias; to report symptoms of hepatic dysfunction
• To keep graph of weight, pulse, mood
• To avoid OTC products that contain iodine
• That seafood, other iodine products may be restricted
• Not to discontinue product abruptly because thyroid crisis may occur; about stress response
• That response may take several months if thyroid is large
• About the symptoms/signs of overdose: periorbital edema, cold intolerance, mental depression
• About the symptoms of an inadequate dose: tachycardia, diarrhea, fever, irritability
• To take medication as prescribed; not to skip or double dose; that missed doses should be taken when remembered up to 1 hr before next dose
• To carry emergency ID listing condition, medication

protamine (Rx)

(proe'ta-meen)
Func. class.: Heparin antagonist
Chem. class.: Low-molecular-weight protein

ACTION: Binds heparin, thereby making it ineffective

USES: Heparin, LMWH toxicity, hemorrhage

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (C), breastfeeding, fish allergy, diabetes, previous exposure to protamine, insulins, heparin rebound or bleeding

DOSAGE AND ROUTES

Heparin overdose
• **Adult and child: IV** 1 mg of protamine/100 units heparin given; administer slowly over 1-3 min; max 50 mg/10 min

Enoxaparin overdose
• **Adult: IV** 1 mg protamine/1 mg enoxaparin

Dalteparin/tinzaparin overdose
• **Adult: IV** 1 mg protamine/100 anti-Xa unit

Available forms: Inj 10 mg/ml

Administer:

Direct IV route
• After reconstituting 50 mg/5 ml sterile bacteriostatic water for inj; shake, give ≤20 mg over 1-3 min

Y-site compatibilities: Alfentanil, amikacin, aminophylline, ascorbic acid, atracurium, atropine, azaTHIOprine, aztreonam, benztropine, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, cefTAZidime, chlorproMAZINE, cimetidine, clindamycin, cyanocobalamin, cycloSPORINE, digoxin, diphenhydrAMINE, DOBUTamine, DOPamine, doxycycline, enalaprilat, ePHEDrine, EPINEPHrine, epoetin alfa, erythromycin, esmolol, famotidine, fentaNYL, fluconazole, ganciclovir, gentamicin, glycopyrrolate, hydrOXYzine, imipenem-cilastatin, inamrinone, iohexol, iopamidol, iothalamate, isoproterenol, labetalol, lidocaine, magnesium, mannitol, meperidine, metaraminol, methoxamine, methyldopate, metoclopramide, metoprolol, miconazole, midazolam, minocycline, morphine, multiple vitamins, nalbuphine, naloxone, netilmicin, nitroglycerin, nitroprusside, norepinephrine, ondansetron, oxytocin, papaverine, pentazocine, phenylephrine, polymyxin B, potassium chloride, procainamide, prochlorperazine, promethazine, proprano-

lol, pyridoxine, quiNIDine, ranitidine, Ringer's, ritodrine, sodium bicarbonate, succinylcholine, SUFentanil, theophylline, thiamine, tobramycin, tolazoline, trimetaphan, urokinase, vancomycin, vasopressin, verapamil

SIDE EFFECTS

CNS: Lassitude, flushing
CV: Hypotension, bradycardia, circulatory collapse, capillary leak
GI: Nausea, vomiting, anorexia
HEMA: Bleeding
INTEG: *Rash,* dermatitis, urticaria
RESP: Dyspnea, pulmonary edema, severe respiratory distress, bronchospasm
SYST: Anaphylaxis, angioedema

PHARMACOKINETICS

IV: Onset 5 min, duration 2 hr

NURSING CONSIDERATIONS

Assess:
⚠ **Hypersensitivity:** urticaria, cough, wheezing, have emergency equipment nearby; **allergy to fish;** use with caution; men who have had vasectomies may be more prone to hypersensitivity
• Blood studies (Hct, platelets, occult blood in stools) q3mo
• Coagulation tests (aPTT, ACT) 15 min after dose then again after several hours
• VS, B/P, pulse after 30 min then 3 hr after dose
• Skin rash, urticaria, dermatitis
Perform/provide:
• Storage at 36° F-46° F (2° C-8° C)
Evaluate:
• Therapeutic response: reversal of heparin overdose
Teach patient/family:
• Not to take if allergic to fish

pseudoephedrine (OTC, Rx)

(soo-doh-eh-fed'rin)

Elix Sure Cold, Eltor ✤, Nasofed, Sudafed, Sudafed 24 Hour, Sudogest

Func. class.: Adrenergic
Chem. class.: Substituted phenylethylamine

ACTION: Primary activity through α-effects on respiratory mucosal membranes reducing congestion hyperemia, edema; minimal bronchodilation secondary to β-effects

USES: Nasal decongestant, adjunct for otitis media; with antihistamines

CONTRAINDICATIONS: Hypersensitivity to sympathomimetics, closed-angle glaucoma
Precautions: Pregnancy (C), breastfeeding, cardiac disorders, hyperthyroidism, diabetes mellitus, prostatic hypertrophy, hypertension

DOSAGE AND ROUTES

• **Adult and child >12 yr: PO** 60 mg q6hr; **EXT REL** 120 mg q12hr or 240 mg q24hr
• **Geriatric: PO** 30-60 mg q6hr prn
• **Child 6-12 yr: PO** 30 mg q6hr, max 120 mg/day
• **Child 2-6 yr: PO** 15 mg q6hr, max 60 mg/day
Available forms: Ext rel caps 120, 240 mg; oral sol 15 mg, 30 mg/5 ml; drops 7.5 mg/0.8 ml; tabs 30, 60 mg; caps 60 mg; ext rel tabs 120, 240 mg
Administer:
• Avoid taking at or near bedtime; stimulation can occur

SIDE EFFECTS

CNS: *Tremors, anxiety,* stimulation, insomnia, headache, dizziness, hallucinations, seizures (geriatric patients)

CV: Palpitations, tachycardia, hypertension, chest pain, dysrhythmias, CV collapse
EENT: Dry nose; irritation of nose and throat
GI: *Anorexia, nausea, vomiting,* dry mouth, ischemic colitis
GU: Dysuria

PHARMACOKINETICS

PO: Onset 15-30 min; duration 4-6 hr, 8-12 hr (ext rel); metabolized in liver; excreted in feces and breast milk; terminal half-life 9-16 hr

INTERACTIONS

⚠ Do not use with MAOIs or tricyclics; hypertensive crisis may occur
Increase: effect of this product—urinary alkalizers, adrenergics, β-blockers, phenothiazines, tricyclics
Decrease: effect of this product—urinary acidifiers

NURSING CONSIDERATIONS

Assess:
• Nasal congestion: auscultate lung sounds; check for tenacious bronchial secretions
• B/P, pulse throughout treatment
• CNS side effects in geriatric patients: excitation, seizures, hallucinations
Perform/provide:
• Storage at room temperature
Evaluate:
• Therapeutic response: decreased nasal congestion
Teach patient/family:
• About the reason for product administration
• Ext rel: do not divide, crush, chew, or dissolve
• Do not use within 14 days of MAOIs
• Not to use continuously or to take more than recommended dose because rebound congestion may occur
⚠ To notify prescriber immediately of anxiety; slow or fast heart rate; dyspnea; seizures
• To check with prescriber before using other products because product interactions may occur
• To avoid taking near bedtime because stimulation can occur
• Not to use if stimulation, restlessness, tremors occur
• That use in children may cause excessive agitation

pseudoephedrine nasal agent

See Appendix B

psyllium (OTC, Rx)

(sill'ee-um)
Hydrocil, Leader Fiber Laxative, Metamucil, Natural Fiber, Natural Vegetable Fiber, Reguloid, Wal-Mucil
Func. class.: Bulk laxative
Chem. class.: Psyllium colloid

ACTION: Bulk-forming laxative

USES: Chronic constipation, ulcerative colitis
Unlabeled uses: Diarrhea, diverticulosis, irritable bowel syndrome, hypercholesterolemia

CONTRAINDICATIONS: Hypersensitivity, intestinal obstruction, abdominal pain, nausea, vomiting, fecal impaction
Precautions: Pregnancy (C)

DOSAGE AND ROUTES

• **Adult: PO** 1-2 tsp in 8 oz water bid or tid then 8 oz water or 1 premeasured packet in 8 oz water bid or tid, then 8 oz water
• **Child >6 yr: PO** 1 tsp in 4 oz water at bedtime
Available forms: Chew pieces 1.7, 3.4 g/piece; effervescent powder 3.4, 3.7 g/

packet; powder 3.3, 3.4, 3.5, 4.94 g/tsp; wafers 3.4 g/wafer

Administer:

PO route

- Alone for better absorption, separate from other products by 1-2 hr
- In morning or evening (oral dose)
- Immediately after mixing with water or will congeal
- With 8 oz water or juice followed by another 8 oz of fluid

SIDE EFFECTS

GI: *Nausea, vomiting, anorexia, diarrhea,* cramps, intestinal esophageal blockage

PHARMACOKINETICS

Onset 12-72 hr, excreted in feces, not absorbed in GI tract

INTERACTIONS

Decrease: absorption of cardiac glycosides, oral anticoagulants, salicylates

Drug/Herb

Increase: laxative effect—flax, senna

NURSING CONSIDERATIONS

Assess:

- Blood, urine electrolytes if used often
- I&O ratio to identify fluid loss
- **Constipation:** cause of constipation; fluids, bulk, exercise missing; bowel sounds, distention, usual bowel function; color, consistency, amount
- Cramping, rectal bleeding, nausea, vomiting; product should be discontinued

Evaluate:

- Therapeutic response: decrease in constipation, decreased diarrhea with colitis

Teach patient/family:

- To maintain adequate fluid consumption
- That normal bowel movements do not always occur daily
- Not to use in presence of abdominal pain, nausea, vomiting
- To notify prescriber if constipation unrelieved or if symptoms of electrolyte imbalance occur: muscle cramps, pain, weakness, dizziness, excessive thirst

pyridostigmine (Rx)

(peer-id-oh-stig'meen)

Mestinon, Mestinon Timespan, Regonol

Func. class.: Cholinergic; anticholinesterase

Chem. class.: Tertiary amine carbamate

ACTION: Inhibits destruction of acetylcholine, which increases concentration at sites where acetylcholine is released; this facilitates the transmission of impulses across the myoneural junction

USES: Nondepolarizing muscle relaxant antagonist, myasthenia gravis, pretreatment for nerve gas exposure (military only)

CONTRAINDICATIONS: Bradycardia; hypotension; obstruction of intestine, renal system; bromide, benzyl alcohol sensitivity; adrenal insufficiency; cholinesterase inhibitor toxicity

Precautions: Pregnancy (C), seizure disorders, bronchial asthma, coronary occlusion, hyperthyroidism, dysrhythmias, peptic ulcer, megacolon, poor GI motility

DOSAGE AND ROUTES

Myasthenia gravis

- **Adult: PO** 600 mg/day in 5-6 divided doses, max 1.5 g/day; **IM/IV** 2 mg or $^1/_{30}$ of **PO** dose; **SUS REL** 180-540 mg/day or bid at intervals of ≥6 hr
- **Child: PO** 7 mg/kg/day in 5-6 divided doses; **IM/IV** 0.05-0.15 mg/kg/dose

Nondepolarizing neuromuscular blocker antagonist

- **Adult:** 0.6-1.2 mg **IV** atropine then 0.1-0.25 mg/kg/dose
- **Child: IV** 0.1-0.25 mg/kg/dose

Nerve gas exposure prophylaxis (military)

- **Adult: PO** 30 mg q8hr if threat of exposure to Soman gas is anticipated; start several hours prior to exposure and discontinue upon exposure; after product is discontinued, give antidotes (atropine, pralidoxime)

Available forms: Tabs 60 mg; ext rel tabs 180 mg; syr 60 mg/5 ml; inj 5 mg/ml

Administer:

- Only with atropine sulfate available for cholinergic crisis
- Only after all other cholinergics have been discontinued
- Increased doses for tolerance as ordered
- Larger doses after exercise or fatigue as ordered
- Do not break, crush, or chew sus rel tabs

PO route

- On empty stomach for better absorption

Direct IV route

- Undiluted (5 mg/ml), give through Y-tube or 3-way stopcock, give ≤0.5 mg/min (myasthenia gravis); 5 mg/min (reversal of nondepolarizing neuromuscular blockers)

Syringe compatibilities: Glycopyrrolate

Y-site compatibilities: Heparin, hydrocortisone, potassium chloride, vit B/C

SIDE EFFECTS

CNS: Dizziness, headache, sweating, weakness, seizures, incoordination, paralysis, drowsiness, LOC

CV: Tachycardia, dysrhythmias, bradycardia, AV block, hypotension, ECG changes, cardiac arrest, syncope

EENT: Miosis, blurred vision, lacrimation, visual changes

GI: *Nausea, diarrhea, vomiting, cramps, increased salivary and gastric secretions, peristalsis*

GU: Urinary frequency, incontinence, urgency

INTEG: Rash, urticaria, flushing

RESP: Respiratory depression, bronchospasm, constriction, laryngospasm, respiratory arrest

SYST: Cholinergic crisis

PHARMACOKINETICS

Metabolized in liver, excreted in urine (unchanged)

PO: Onset 20-30 min, duration 3-6 hr

PO-EXT REL: Onset 30-60 min, duration 6-12 hr

IM/IV/SUBCUT: Onset 2-15 min, duration 2½-4 hr

INTERACTIONS

Increase: action—succinylcholine

Decrease: action—gallamine, metocurine, pancuronium, tubocurarine, atropine

Decrease: pyridostigmine action—aminoglycosides, anesthetics, procainamide, quiNIDine, mecamylamine, polymyxin, magnesium, corticosteroids, antidysrhythmics, quinolones

NURSING CONSIDERATIONS

Assess:

- **Myasthenia gravis:** fatigue, ptosis, diplopia, difficulty swallowing, SOB, hand/gait before, after product; improvement should be seen after 1 hr
- VS, respiration q8hr
- I&O ratio; check for urinary retention or incontinence
- **Toxicity:** bradycardia, hypotension, bronchospasm, headache, dizziness, seizures, respiratory depression; product should be discontinued if toxicity occurs

Evaluate:

- Therapeutic response: increased muscle strength, hand grasp, improved gait, absence of labored breathing (if severe); reversal of nondepolarizing neuromus-

cular blockers; prevention of nerve gas toxicity

Teach patient/family:

- **Myasthenia gravis:** that product is not a cure, only relieves symptoms
- To wear emergency ID specifying myasthenia gravis, products taken
- To avoid driving, other hazardous activities until effect is known
- To report muscle weakness (cholinergic crisis or underdosage), bradycardia
- Not to drink alcohol
- To take with food to decrease gastric side effects

TREATMENT OF OVERDOSE:

Discontinue product, atropine 1-4 mg IV

pyridoxine (vit B_6) (Rx, OTC)

(peer-i-dox'een)

Equaline Vitamin B6, Neuro-K, Walgreens Finest B-6, Walgreens Gold Seal Vitamin B6

Func. class.: Vit B_6, water soluble

ACTION: Needed for fat, protein, carbohydrate metabolism; enhances glycogen release from liver and muscle tissue; needed as coenzyme for metabolic transformations of a variety of amino acids

USES: Vit B_6 deficiency of inborn errors of metabolism, seizures, isoniazid therapy, oral contraceptives, alcoholic polyneuritis

Unlabeled uses: Palmar-plantar erythrodysesthesia syndrome

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (A), breastfeeding, children, Parkinson's disease; patients taking levodopa should avoid supplemental vitamins with >5 mg pyridoxine

DOSAGE AND ROUTES

RDA

- **Adult: PO** (male) 1.7-2 mg; (female) 1.4-1.6 mg
- **Child 9-13 yr: PO** 1 mg/day
- **Child 4-8 yr: PO** 0.6 mg/day
- **Child 1-3 yr: PO** 0.5 mg/day
- **Infant 7-12 mo: PO** 0.3 mg/day

Vit B_6 deficiency

- **Adult: PO** 5-25 mg/day × 3 wk
- **Child: PO** 10 mg until desired response

Pyridoxine deficiency neuritis/seizure (not drug induced)

- **Adult: PO** *without neuritis* 2.5-10 mg/day after corrected 2-5 mg/day; *with neuritis* 100-200 mg/day × 3wk then 2-5 mg/day
- **Child: PO** *without neuritis* 5-25 mg/day × 3wk then 1.5-2.5 mg/day in a multivitamin; *with neuritis:* 10-50 mg/day × 3wk then 1-2 mg/day
- **Neonate with seizures: IM/IV** 50-100 mg as single dose

Deficiency caused by isoniazid, cycloSERINE, hydrALAZINE, penicillamine

- **Adult: PO** 100-300 mg/day
- **Child: PO** 10-50 mg/day

Prevention of deficiency caused by isoniazid, cycloSERINE, hydrALAZINE, penicillamine

- **Adult: PO** 25-100 mg/day
- **Child: PO** 1-2 mg/kg/day

Palmar-plantar erythrodysesthesia syndrome (unlabeled)

- **Adult: PO** 50-150 mg/day

Available forms: Tabs 10, 25, 50, 100 mg; ext rel tabs 100 mg; inj 100 mg/ml; ext rel caps 150 mg

Administer:

PO route

- Do not break, crush, or chew ext rel tabs/caps

IM route

- Rotate sites; burning or stinging at site may occur
- Z-track to minimize pain

IV route
- Undiluted or added to most IV sol; give ≤50 mg/1 min if undiluted

Syringe compatibilities: Doxapram

SIDE EFFECTS

CNS: Paresthesia, flushing, warmth, lethargy (rare with normal renal function)
INTEG: Pain at inj site

PHARMACOKINETICS

PO/INJ: Half-life 2-3 wk, metabolized in liver, excreted in urine

INTERACTIONS

Decrease: effects of levodopa
Decrease: effects of pyridoxine—oral contraceptives, isoniazid, cycloSERINE, hydrALAZINE, penicillamine, chloramphenicol, immunosuppressants

NURSING CONSIDERATIONS

Assess:
- **Pyridoxine deficiency:** seizures, irritability, cheilitis, conjunctivitis, anemia, confusion, red tongue, weakness, fatigue prior to and during treatment; monitor pyridoxine levels
- Nutritional status: yeast, liver, legumes, bananas, green vegetables, whole grains
- Blood studies: Hct, Hgb

Perform/provide:
- Storage in tight, light-resistant container

Evaluate:
- Therapeutic response: absence of nausea, vomiting, anorexia, skin lesions, glossitis, stomatitis, edema, seizures, restlessness, paresthesia

Teach patient/family:
- To avoid vitamin supplements unless directed by prescriber
- To increase meat, bananas, potatoes, lima beans, whole grain cereals in diet
- To take as directed; to continue with follow-up exams, blood work

pyrimethamine (Rx)

(peer-i-meth'a-meen)

Daraprim

Func. class.: Antimalarial, antiprotozoal

Chem. class.: Folic acid antagonist

ACTION: Inhibits folic acid metabolism in parasite, prevents transmission by stopping growth of fertilized gametes

USES: Malaria prophylaxis, *Plasmodium vivax, Pneumocystis jiroveci*
Unlabeled uses: Isosporiasis, pneumocystis pneumonia prophylaxis, toxoplasmic encephalitis prophylaxis

CONTRAINDICATIONS: Hypersensitivity, chloroquine-resistant malaria, megaloblastic anemia caused by folate deficiency
Precautions: Pregnancy (C), breastfeeding, geriatric patients, blood dyscrasias, seizure disorder, G6PD disease, renal/hepatic disease

DOSAGE AND ROUTES

Prophylaxis of malaria
Begin 2 wk before entering endemic area, continue for 6-10 wk after return
- **Adult/child >10 yr: PO** 25 mg/wk
- **Child 4-10 yr: PO** 12.5 mg/wk
- **Child <4 yr: PO** 6.25 mg/wk

Malaria treatment
- **Adult/adolescent/child >10 yr: PO** 25 mg q day × 2 days with a sulfonamide
- **Child 4-10 yr: PO** 25 mg/day × 2 days

Toxoplasmosis
- **Adult: PO** 50-75 mg, then reduce by about 50% for 4-5 wk with 1-4 g sulfadoxine × 1-3 wk, then reduce by 50% for 4-5 wk
- **Child: PO** 1 mg/kg/day in 2 divided doses or 2 mg/kg/day × 3 days then 1 mg/kg/day or divided twice daily × 4 wk, max 25 mg/day

Toxoplasmosis in AIDS patients
• **Adult: PO** 100-200 mg/day × 1-2 days, then 50-100 mg/day × 3-6 wk, then 25-50 mg/day for life (given with clindamycin or sulfADIAZINE)
Isosporiasis (unlabeled)
• **Adult: PO** 75 mg/day with leucovorin 10 mg/day × 14 days
Available forms: Tabs 25 mg; combo tabs 500 mg sulfadoxine/25 mg pyrimethamine
Administer:
PO route
• Leucovorin IM 3-9 mg/day × 3 days if folic acid deficiency occurs
• Before or after meals at same time each day to maintain product level, decrease GI symptoms
• **Extemporaneous susp:** tabs may be crushed and mixed with 25 ml distilled water, sucrose-containing solution (1 mg/ml); shake well, stable for 5-7 days at room temperature if mixed with sucrose-containing solutions

SIDE EFFECTS

CNS: Stimulation, irritability, seizures, tremors, ataxia, fatigue, fever
CV: Dysrhythmias
GI: *Nausea, vomiting, cramps, anorexia,* diarrhea, atrophic glossitis, gastritis
HEMA: Thrombocytopenia, leukopenia, pancytopenia, megaloblastic anemia, decreased folic acid, agranulocytosis
INTEG: Skin eruptions, photosensitivity, Stevens-Johnson syndrome
RESP: Respiratory failure

PHARMACOKINETICS

PO: Peak 2 hr, half-life 96 hr, half-life accelerated to 23 hr in AIDS patients, metabolized in liver, highly protein bound, excreted in urine (metabolites)

INTERACTIONS

• Synergistic action: folic acid
Increase: Megaloblastic anemia risk, agranulocytosis, thrombocytopenia—zidovudine
Increase: bone marrow suppression—bone marrow depressants, folate antagonists, radiation therapy

NURSING CONSIDERATIONS

Assess:
• Folic acid level; megaloblastic anemia occurs
⚠ **Blood dyscrasias:** blood studies, CBC, platelets; 2×/wk if dosage is increased
⚠ **Toxicity:** vomiting, anorexia, seizure, blood dyscrasia, glossitis; product should be discontinued immediately
• **Serious skin disorders:** Stevens-Johnson syndrome (swelling of face, lips, throat, fever)
Perform/provide:
• Storage in tight, light-resistant container
Evaluate:
• Therapeutic response: decreased symptoms of malaria, toxoplasmosis
Teach patient/family:
• To report visual problems, fever, fatigue, bruising, bleeding, sore throat; may indicate **blood dyscrasias**

TREATMENT OF OVERDOSE:

Gastric lavage, short-acting barbiturate, leucovorin, respiratory support if needed

Q

QUEtiapine (Rx)

(kwe-tie'a-peen)
Seroquel, Seroquel XR
Func. class.: Antipsychotic, atypical
Chem. class.: Dibenzothiazepine

ACTION: Functions as an antagonist at multiple neurotransmitter receptors in the brain, including $5HT_{1A}$, $5HT_2$, dopamine D_1, D_2, H_1, and adrenergic α_1, α_2 receptors

USES: Bipolar disorder, bipolar I disorder, depression, mania, schizophrenia
Unlabeled uses: Agitation, dementia, OCD, acute psychosis

CONTRAINDICATIONS:

Hypersensitivity, breastfeeding

Precautions: Pregnancy (C), geriatric patients, hepatic/cardiac disease, breast cancer, long-term use, seizures, QT prolongation, brain tumor, hematologic disease, torsades de pointes, cataracts, dehydration, abrupt discontinuation

Black Box Warning: Children, suicidal ideation, increased mortality in elderly patients with dementia-related psychosis

DOSAGE AND ROUTES

Bipolar I disorder

- **Adult: PO** (monotherapy or adjunct to lithium, divalproex), not at increased risk for hypotension 50 mg bid on day 1, 100 mg on day 2 in 2 divided doses as tolerated to 400 mg/day on day 4, range 400-800 mg/day
- **Geriatric, debilitated, or at risk for hypotension: PO** 25 mg bid, titrate upward slowly
- **Child ≥10 yr/adolescents: PO** 25 mg bid day 1, 50 mg, bid day 2, 100 mg bid day 3, 150 mg bid day 4, 300 mg bid beginning day 5 dose adjusted

Schizophrenia

- **Adult: PO** (not at risk for hypotension) 25 mg bid, titrate upward; (XR) 300 mg/day in PM, range 400-800 mg/day

Depressive disorder (inadequate response to antidepressants alone)

- **Adult: PO EXT REL** 50 mg/day in PM on days 1, 2; on day 3, give 150 mg in PM
- **Geriatric, debilitated or at risk for hypotension: PO EXT REL** 50 mg, may increase by 50 mg/day based on response

Available forms: Tabs 25, 50, 100, 200, 300, 400 mg; ext rel tab 50, 150, 200, 300, 400 mg

Administer:

- Reduced dose to geriatric patients
- Anticholinergic agent on order from prescriber for EPS
- Avoid use of CNS depressants
- **Immediate release:** without regard to meals
- **Ext rel:** without food or with light meal ≤300 calories; swallow whole; do not split, crush, chew, can switch from immediate release to extended release by giving total daily dose q day

SIDE EFFECTS

CNS: EPS, pseudoparkinsonism, akathisia, dystonia, tardive dyskinesia; *drowsiness,* insomnia, agitation, anxiety, *headache,* seizures, neuroleptic malignant syndrome, *dizziness,* dystonia, restless legs

CV: Orthostatic hypotension, tachycardia, QT prolongation, CV disease, Parkinson's disease, cardiomyopathy, myocarditis

ENDO: SIADH, hyperglycemia

GI: *Nausea, anorexia, constipation,* abdominal pain, dry mouth

HEMA: Leukopenia, agranulocytosis

INTEG: Rash

META: Hyponatremia

MISC: Asthenia, back pain, fever, ear pain

MS: Rhabdomyolysis

RESP: Rhinitis

SYST: Stevens-Johnson syndrome, anaphylaxis

PHARMACOKINETICS

Extensively metabolized by liver, half-life ≥6 hr, peak 1½ hr, ext rel 6 hr, inhibits P450 CYP3A4 enzyme system, 83% protein binding, excretion: 73% urine, 20% feces

INTERACTIONS

Increase: QT prolongation—class IA/III antidysrhythmics, some phenothiazines, β-agonists, local anesthetics, tricyclics, haloperidol, methadone, chloroquine, clarithromycin, droperidol, erythromycin, pentamidine

Increase: CNS depression—alcohol, opioid analgesics, sedative/hypnotics, antihistamines

Increase: hypotension—alcohol, antihypertensives

Increase: QUEtiapine clearance, decrease QUEtiapine effect—phenytoin,

thioridazine, barbiturates, glucocorticoids, carBAMazepine, rifampin
Increase: QUEtiapine action—fluconazole, itraconazole, ketoconazole (CYP3A4 inhibitors)
Increase: effects of erythromycin
Decrease: QUEtiapine clearance—cimetidine
Decrease: effects of DOPamine agonists, levodopa, LORazepam
Drug/Lab Test
Increase: cholesterol, triglycerides, LFTs, glucose
Decrease: thyroid tests, WBC

NURSING CONSIDERATIONS

Assess:
⚠ CV status: QT prolongation, tachycardia, orthostatic B/P

Black Box Warning: Mental status before initial administration, AIMS assessment; affect, orientation, LOC, reflexes, gait, coordination, sleep pattern disturbances; suicidal thoughts/behaviors (child/young adult); dementia (geriatric patients)

⚠ **Suicide:** restrict amount of product given; usually suicidal thoughts/behaviors occur early during treatment and among children/adolescents/young adults
• Baseline blood glucose, LFTs, neurologic function, ophthalmologic exam, cholesterol profile, weight, monitor glucose often in diabetes mellitus
• B/P standing, lying; pulse, respirations; determine q4hr during initial treatment; establish baseline before starting treatment; report drops of 30 mm Hg; watch for ECG changes
• Dizziness, faintness, palpitations, tachycardia on rising
• **EPS:** including akathisia (inability to sit still, no pattern to movements), tardive dyskinesia (bizarre movements of jaw, mouth, tongue, extremities), pseudoparkinsonism (rigidity, tremors, pill rolling, shuffling gait)
⚠ **Neuroleptic malignant syndrome:** hyperthermia, increased CPK, altered mental status, muscle rigidity, seizures, tachycardia, diaphoresis, hypo/hypertension, fatigue; notify prescriber immediately if symptoms occur
• Constipation, urinary retention daily; if these occur, increase bulk, water in diet

Perform/provide:
• Supervised ambulation until patient stabilized on medication; do not involve patient in strenuous exercise program because fainting possible; patient should not stand still for long period of time
• Storage in tight, light-resistant container

Evaluate:
• Therapeutic response: decrease in emotional excitement, hallucinations, delusions, paranoia; reorganization of patterns of thought, speech

Teach patient/family:
• Not to become overheated
• Not to use if pregnancy is planned or suspected, not to breastfeed
• To rise slowly to prevent orthostatic hypotension
• To take medication only as prescribed, not to crush, chew ext rel product, not to use with alcohol, to take regular tabs without regard to food, ext rel without food
• That follow-up is necessary, including LFTs, blood glucose, neurologic, cholesterol profile, weight
• If drowsiness occurs, to avoid hazardous activities such as driving, not to stand quickly, may be worse during first few days of dose change
• To avoid use of OTC meds unless directed by prescriber
• To notify prescriber if pregnancy planned, suspected; not to breastfeed
• To notify prescriber immediately of fever, difficulty breathing, fatigue, sore throat, rash, bleeding
• **Suicide:** thoughts/behaviors, primarily among children/adolescents/young adults
• To have eye exam before treatment and q6mo, cataracts may occur

quinapril (Rx)

(kwin'a-pril)

Accupril

Func. class.: Antihypertensive

Chem. class.: Angiotensin-converting enzyme (ACE) inhibitor

ACTION: Selectively suppresses renin-angiotensin-aldosterone system; inhibits ACE, prevents conversion of angiotensin I to angiotensin II; results in dilation of arterial, venous vessels

USES: Hypertension, alone or in combination with thiazide diuretics; systolic CHF

CONTRAINDICATIONS: Children, hypersensitivity to ACE inhibitors, angioedema

Black Box Warning: Pregnancy (D)

Precautions: Breastfeeding, geriatric patients, impaired renal/hepatic function, dialysis patients, hypovolemia, blood dyscrasias, COPD, bilateral renal stenosis, asthma, cough, hyperkalemia

DOSAGE AND ROUTES

Hypertension

- **Adult: PO** 10-20 mg/day initially then 20-80 mg/day divided bid or daily (monotherapy); start at 5 mg/day (with diuretics)
- **Geriatric: PO** 10 mg/day, titrate to desired response (monotherapy); start at 2.5 mg/day (with diuretics)

Congestive heart failure

- **Adult: PO** 5 mg bid, may increase weekly until 20-40 mg/day in 2 divided doses

Renal dose

- **Adult: PO** CCr 30-60 ml/min, 5 mg/day initially; CCr <30 ml/min, 2.5 mg/day initially

Available forms: Tabs 5, 10, 20, 40 mg

Administer:

- Tabs may be crushed if necessary
- Take 1-2 hr before food or antacids; avoid high-fat foods
- Store in airtight container at room temp

SIDE EFFECTS

CNS: *Headache, dizziness, fatigue,* somnolence, depression, malaise, nervousness, vertigo

CV: *Hypotension,* postural hypotension, syncope, palpitations, angina pectoris, MI, tachycardia, vasodilation, chest pain

GI: *Nausea,* diarrhea, constipation, *vomiting,* gastritis, GI hemorrhage, dry mouth

GU: Increased BUN, creatinine; decreased libido, impotence

INTEG: Angioedema, rash, sweating, photosensitivity, pruritus

META: Hyperkalemia

MISC: Back pain, amblyopia

MS: Myalgia

RESP: *Cough,* pharyngitis, dyspnea

PHARMACOKINETICS

Bioavailability ≥60%, onset <1 hr, peak 1-2 hr, duration 24 hr, protein binding 97%, half-life 2 hr, metabolized by liver (active metabolites quinaprilat), metabolites excreted in urine (60%)/feces (37%)

INTERACTIONS

- Use caution with vasodilators, hydrALAZINE, prazosin, potassium-sparing diuretics, sympathomimetics, potassium supplements, ACE/angiotensin II receptor antagonists

Increase: hypotension—diuretics, other antihypertensives, ganglionic blockers, adrenergic blockers, phenothiazines, nitrates, acute alcohol ingestion

Increase: toxicity of lithium

Decrease: absorption of tetracycline, quinolone antibiotics

Decrease: hypotensive effect of quinapril—NSAIDs

Drug/Lab Test

Increase: potassium, creatinine, BUN, LFTs

NURSING CONSIDERATIONS

Assess:

⚠ **Collagen-vascular disease:** blood studies: neutrophils, decreased platelets; WBC with differential at baseline, periodically, q3mo; if neutrophils <1000/mm³, discontinue treatment

• **Hypertension:** B/P, orthostatic hypotension, syncope, monitor B/P before giving and after 2 hr, African American patients are more resistant to antihypertension effect

• Renal studies: protein, BUN, creatinine; watch for increased levels; may indicate nephrotic syndrome

• Baselines of hepatic studies before therapy, periodically; increased LFTs; uric acid, glucose may be increased

• Potassium levels; hyperkalemia rare

• **CHF:** edema in feet, legs daily; weight daily

⚠ **Allergic reactions:** rash, fever, pruritus, urticaria, swelling of eyes/face/throat/neck, SOB, difficulty breathing; product should be discontinued, angioedema is more common in African American patients

Black Box Warning: For pregnancy (D), 2nd/3rd trimester, if pregnancy is suspected, discontinue use

Evaluate:

• Therapeutic response: decrease in B/P

Teach patient/family:

• Not to discontinue product abruptly

• Not to use OTC products (cough, cold, allergy); not to use salt substitutes containing potassium unless directed by prescriber, avoid high-fat meal at same time as product

• To comply with dosage schedule, even if feeling better

• To rise slowly to sitting or standing position to minimize orthostatic hypotension

• To notify prescriber of mouth sores, sore throat, fever, swelling of hands/feet, irregular heartbeat, chest pain, persistent dry cough

• To report excessive perspiration, dehydration, vomiting, diarrhea; may lead to fall in B/P

• That product may cause dizziness, fainting, lightheadedness; may occur during first few days of therapy

• That product may cause skin rash, impaired taste perception

• How to take B/P, normal readings for age group

Black Box Warning: Pregnancy: to report if pregnancy planned, suspected; pregnancy category (D) 2nd/3rd trimester, do not breastfeed

TREATMENT OF OVERDOSE:

0.9% NaCl IV inf

quiNIDine gluconate (Rx)

(kwin'i-deen)

quiNIDine sulfate (Rx)

Func. class.: Antidysrhythmic (Class IA)

Chem. class.: Quinine dextroisomer

Do not confuse:

quiNIDine/quiNINE

ACTION: Prolongs duration of action potential and effective refractory period, thus decreasing myocardial excitability; anticholinergic properties

USES: PVCs, atrial fibrillation, PAT, ventricular tachycardia, atrial flutter, malaria/IV quiNIDine gluconate

CONTRAINDICATIONS: Hypersensitivity, idiosyncratic response, digoxin toxicity, blood dyscrasias, myasthenia gravis

Black Box Warning: History of long QT syndrome, product-induced torsades de pointes, severe heart block

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, potassium imbalance, renal/hepatic dis-

ease, CHF, respiratory depression, bradycardia, hypotension, syncope

Black Box Warning: Cardiac arrhythmias, MI

DOSAGE AND ROUTES

QuiNIDine gluconate

• **Adult: PO** (ext rel) 324-648 mg q8-12hr; **IM** 600 mg then 400 mg q2hr; **IV** give 16 mg/min

Malaria

• **Adult/adolescents/children/infants: IV Regimen 1:** Loading dose 24/kg (15 mg/kg base) over 4 hr, then 12 mg/kg (7.5 mg/kg base) over 4 hr q8hr, starting 8 hr after beginning of loading dose × 7 days in SE Asia, 3 days in Africa or South America, maintenance infusions may be replaced with PO if feasible; **Regimen 2:** Loading dose IV 10 mg/kg (6.25 base) over 1-2 hr, then 0.02 mg/kg (0.0125/kg/min base) for ≥24 hr

QuiNIDine sulfate

Atrial fibrillation/flutter

• **Adult: PO** 200 mg q2-3hr × 5-8 doses; may increase daily until sinus rhythm restored; max 4 g/day given only after digitalization; maintenance 200-300 mg tid-qid or **EXT REL** 300-600 mg q8-12hr

Paroxysmal supraventricular tachycardia

• **Adult: PO** 400-600 mg q2-3hr then 200-300 mg q6-8hr or **EXT REL** 300-600 mg q8-12hr

Premature atrial/ventricular contraction

• **Adult: PO** 200-300 mg q6-8hr or **EXT REL** 300-600 mg q8-12hr; max 4 g/day

• **Child: PO** 30 mg/kg/day or 900 mg/m²/day in 5 divided doses

Available forms: *Gluconate:* ext rel tabs 324, 330 mg; inj gluconate 80 mg/ml; *sulfate:* tabs 200, 300 mg; sus rel tabs 300 mg

Administer:

• AV node blocker (digoxin) before starting quinidine to avoid increased ventricular rate

PO route

• Do not break, crush, chew ext rel products

• With full glass of water on empty stomach; if GI upset occurs, may take with food

• Sus rel forms not interchangeable

• Do not use with grapefruit juice

IM route

• IM inj in deltoid; aspirate to avoid intravascular administration

Intermittent IV INF route

• After diluting 800 mg/50 ml D_5W (16 mg/ml); give ≤1 mg/min, use infusion pump; quiNIDine absorbed by PVC tubing, minimize length

Y-site compatibilities: Alfentanil, amikacin, anidulafungin, ascorbic acid, atenolol, atracurium, atropine, benztropine, bleomycin, bumetanide, buprenorphine, butorphanol, calcium gluconate, caspofungin, chlorproMAZINE, cimetidine, CISplatin, cyanocobalamin, cycloSPORINE, DACTINomycin, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, doxycycline, enalaprilat, ePHEDrine, EPINEPHrine, epoetin alfa, erythromycin, esmolol, etoposide, famotidine, fenoldopam, fentaNYL, fluconazole, fludarabine, gatifloxacin, gemcitabine, gentamicin, glycopyrrolate, granisetron, HYDROmorphone, IDArubicin, imipenem-cilastatin, irinotecan, isoproterenol, labetalol, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, meperidine, metaraminol, methoxamine, methyldopate, metoclopramide, metoprolol, metroNIDAZOLE, miconazole, milrinone, mitoXANtrone, morphine, multiple vitamins, mycophenolate, nalbuphine, naloxone, nesiritide, netilmicin, nitroglycerin, norepinephrine, octreotide, ondansetron, oxaliplatin, PACLitaxel, palonosetron, pamidronate, pancuronium, papaverine, pentamidine, pentazocine, phenylephrine, phytonadione, polymyxin B, potassium chloride, procainamide, prochlorperazine, promethazine, propranolol, protamine, pyri-

doxine, ranitidine, ritodrine, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiamine, thiotepa, tirofiban, tobramycin, tolazoline, trimetaphan, urokinase, vancomycin, vasopressin, verapamil, vinorelbine, voriconazole, zoledronic acid

SIDE EFFECTS

CNS: *Headache, dizziness,* involuntary movement, confusion, psychosis, restlessness, irritability, syncope, excitement, depression, ataxia

CV: Hypotension, *bradycardia,* PVCs, heart block, CV collapse, arrest, torsades de pointes, widening QRS complex, ventricular tachycardia

EENT: Cinchonism: tinnitus, blurred vision, hearing loss, mydriasis, disturbed color vision

GI: Nausea, vomiting, anorexia, abdominal pain, *diarrhea,* hepatotoxicity

HEMA: Thrombocytopenia, hemolytic anemia, agranulocytosis, hypoprothrombinemia

INTEG: Rash, urticaria, angioedema, swelling, photosensitivity, flushing with severe pruritus

RESP: Dyspnea, respiratory depression

PHARMACOKINETICS

PO: Peak 0.5-6 hr, duration 6-8 hr, half-life 6-7 hr, metabolized in liver, excreted unchanged (10%-50%) by kidneys, protein bound (80%-90%)

INTERACTIONS

• Additive vagolytic effect: anticholinergic blockers

Increase: cardiac depression: other antidysrhythmics, phenothiazines, reserpine

Increase: effects of neuromuscular blockers, digoxin, warfarin, tricyclics, propranolol

Increase: QT prolongation—macrolides, quinolones, tricyclics procainamide, antipsychotics

Increase: quiNIDine effects—cimetidine, sodium bicarbonate, carbonic anhydrase inhibitors, antacids, hydroxide suspensions, amiodarone, verapamil, NIFEdipine, protease inhibitors

Decrease: quiNIDine effects—barbiturates, phenytoin, rifampin, sucralfate, cholinergics

Drug/Herb

Increase: quiNIDine effect—hawthorn

Drug/Food

• Delayed absorption, decreased metabolism: grapefruit juice

Drug/Lab Test

Increase: Hgb

Decrease: platelets

Interference: triamterene therapy interferes with quiNIDine test levels

NURSING CONSIDERATIONS

Assess:

⚠ ECG B/P, pulse continuously during IV, baseline, and periodically (PO) to determine increased PR or QRS segments, QT interval; discontinue product or reduce dose

• Blood levels (therapeutic level 2-7 mcg/ml), CBC, LFTs

⚠ **For cinchonism:** tinnitus, headache, nausea, dizziness, fever, vertigo, tremor; may lead to hearing loss

• **Cardiac toxicity:** asystole, ventricular dysrhythmias, widening QRS, torsades de pointes

• CNS effects: dizziness, confusion, psychosis, paresthesias, seizures; product should be discontinued

• **Hepatotoxicity:** monitor LFTs for first 1-2 mo of treatment

Evaluate:

• Therapeutic response: decreased dysrhythmias

Teach patient/family:

• That if dizziness, drowsiness occurs, to avoid driving or hazardous activities

• To use sunglasses; product may cause sensitivity to light

• To carry emergency ID stating disease, medication use

• How to take pulse, when to notify prescriber

• To avoid all products unless approved by prescriber

Q

- Not to crush, chew ext rel product
- Do not use grapefruit juice with this product
- **QuiNIDine toxicity:** visual changes, nausea, headache, ringing in the ears, report immediately
- To report signs of cinchonism, diarrhea, anorexia, decreased B/P

RABEprazole (Rx)

(rah-bep'rah-zole)

Aciphex, Pariet ♣

Func. class.: Antiulcer, proton pump inhibitor

Chem. class.: Benzimidazole

Do not confuse:
Aciphex/Aricept/Accupril

ACTION: Suppresses gastric secretion by inhibiting hydrogen/potassium ATPase enzyme system in the gastric parietal cells; characterized as a gastric acid pump inhibitor because it blocks the final step of acid production

USES: Gastroesophageal reflux disease (GERD), severe erosive esophagitis, poorly responsive systemic GERD, pathologic hypersecretory conditions (Zollinger-Ellison syndrome, systemic mastocytosis, multiple endocrine adenomas); treatment of active duodenal ulcers with/without antiinfectives for *Helicobacter pylori;* daytime, nighttime heartburn

Unlabeled uses: Gastric ulcer, heartburn, *H. pylori* eradication in children

CONTRAINDICATIONS: Hypersensitivity to this product or proton pump inhibitors (PPIs)

Precautions: Pregnancy (C), breastfeeding, children, Asian patients, diarrhea, geriatric patients, gastric cancer, hepatic/GI disease, IBS, osteoporosis, pseudomembranous colitis, ulcerative colitis, vit B_{12} deficiency

DOSAGE AND ROUTES

Healing of duodenal ulcers

- **Adult: PO** 20 mg/day × ≤4 wk; to be taken after breakfast

Healing of erosive esophagitis or ulcerative GERD

- **Adult: PO** 20 mg/day × 4-8 wk
- **Adolescent and child ≥12 yr: PO** 20 mg/day up to 8 wk

Pathologic hypersecretory conditions

- **Adult: PO** 60 mg/day; may increase to 120 mg in 2 divided doses

Gastric ulcer (unlabeled)

- **Adult: PO** 20 mg/day after AM meal × 3-6 wk

Dyspepsia/heartburn (unlabeled)

- **Adult: PO** 20 mg/day × #14 days

Available forms: Del rel tabs 20 mg

Administer:

- **PO:** Do not break, crush, chew del rel tab; after breakfast daily with full glass of water, without regard to food

SIDE EFFECTS

CNS: *Headache, dizziness, asthenia*

CV: Chest pain, angina, tachycardia, bradycardia, palpitations, peripheral edema

EENT: Tinnitus, taste perversion

GI: *Diarrhea, abdominal pain, vomiting, nausea, constipation, flatulence, acid regurgitation,* abdominal swelling, anorexia, irritable colon, esophageal candidiasis, dry mouth, pseudomembranous colitis

GU: UTI, urinary frequency, increased creatinine, proteinuria, hematuria, testicular pain, glycosuria

HEMA: Pancytopenia, thrombocytopenia, neutropenia, leukocytosis, anemia

INTEG: *Rash,* dry skin, urticaria, pruritus, alopecia

META: Hypoglycemia, increased hepatic enzymes, weight gain

MISC: *Back pain,* fever, fatigue, malaise, Stevens-Johnson syndrome

RESP: *Upper respiratory tract infections, cough,* epistaxis, pneumonia

PHARMACOKINETICS

Eliminated in urine as metabolites and in feces, terminal half-life 1-2 hr, metabolized by CYP2C19 enzyme system, protein binding 96.3%

INTERACTIONS

Increase: bleeding risk—warfarin, clopidogrel
Increase: serum levels of RABEprazole—benzodiazepines, phenytoin, clarithromycin, antacids, other proton pump inhibitors, H_2 blockers
Increase: levels of—digoxin, nelfinavir/omeprazole
Decrease: levels of RABEprazole—sucralfate, calcium carbonate, vit B_{12}
Decrease: levels of ketoconazole, itraconazole, iron salts, atazanavir/ritonavir, ampicillin
Drug/Herb
Decrease: RABEprazole—St. John's wort
Drug/Lab Test
Decrease: magnesium

NURSING CONSIDERATIONS

Assess:
• GI system: bowel sounds, abdomen for pain, swelling, anorexia, emesis/stool for occult blood
• **Pseudomembranous colitis:** may occur with most antibiotic therapy; watery diarrhea, abdominal pain, fever
• **Vit B_{12} deficiency/cyanocobalamin/hypomagnesemia:** may occur after 3-12 mo of treatment; use magnesium, vit B_{12}, cyanocobalamin supplement; if severe, discontinuing of product may be needed
• Hepatic studies: AST, ALT, alk phos during treatment; CBC with differential periodically
⚠ Serious skin reactions: Stevens-Johnson syndrome
• CBC with differential before, periodically during treatment; blood dyscrasias may occur (rare)
• Obtain susceptibility testing if *H. Pylori* treatment is ineffective, another antiinfective may be needed

Evaluate:
• Therapeutic response: absence of epigastric pain, swelling, fullness; decreased symptoms of GERD after 4-8 wk
Teach patient/family:
• To report severe diarrhea or black, tarry stools; product may have to be discontinued
• That hypoglycemia may occur if patient is diabetic
• To avoid hazardous activities because dizziness, drowsiness may occur
• To avoid alcohol, salicylates, NSAIDs because they may cause GI irritation; to avoid other OTC, herbal products unless approved by prescriber
• To use as directed for length of time prescribed; to take missed dose when remembered; not to double dose
• To notify prescriber if pregnancy planned, suspected

radioactive iodine (sodium iodide) ^{131}I (Rx)

Func. class.: Antithyroid
Chem. class.: Radiopharmaceutical

ACTION: Converted to protein-bound iodine by thyroid gland for use when needed

USES:

High dose: Thyroid cancer, hyperthyroidism
Low dose: Visualization to determine thyroid cancer, diagnostic aid for thyroid function studies

CONTRAINDICATIONS: Pregnancy (X), breastfeeding, age <30 yr, recent MI, large nodular goiter, vomiting/diarrhea, acute hyperthyroidism, use of thyroid products

DOSAGE AND ROUTES

Thyroid cancer
• **Adult: PO** 50-150 mCi; may repeat, depending on clinical status

Hyperthyroidism

• **Adult: PO** 4-10 mCi, depending on serum thyroxine level

Available forms: Caps 1-50, 0.8-100 mCi; oral sol 7.05 mCi/ml, 3.5-150 mCi/vial; concentrated oral solution 1000 mCi/ml

Administer:

• Only after discontinuing all other antithyroid agents × 5-7 days

• After NPO overnight; food delays action

• During or within 10 days of menstruation

• Do not take antithyroid agents except propranolol, which decreases hyperthyroid symptoms, until total effect of taking ^{131}I has occurred (about 6 wk)

SIDE EFFECTS

CV: Chest pain, tachycardia

EENT: Sore throat, cough

ENDO: Hypothyroidism, hyperthyroid adenoma, transient thyroiditis, goiter

GI: *Nausea, diarrhea, vomiting*

HEMA: Eosinophilia, lymphedema, leukemia, bone marrow depression, leukopenia, anemia, lymph node swelling

INTEG: Alopecia, rash, pruritus

RESP: Cough

PHARMACOKINETICS

PO: Onset 3-6 days; excreted in urine, sweat, feces, breast milk; crosses placenta; excreted in 56 days

INTERACTIONS

Increase: Hypothyroidism—lithium

Decrease: effect of I^{131}—amiodarone

Decrease: uptake—recent intake of stable iodine, thyroid, antithyroid products

Drugj/Lab Test

Decrease: Hgb, T4, TSH

NURSING CONSIDERATIONS

Assess:

• Weight daily with same clothing, scale, time of day

• Blood work, including CBC for blood dyscrasias (leukopenia, thrombocytopenia, agranulocytosis)

• **Overdose:** peripheral edema, heat intolerance, diaphoresis, palpitations, dysrhythmias, severe tachycardia, increased temp, delirium, CNS irritability

• **Hypersensitivity:** rash, enlarged cervical lymph nodes; product may have to be discontinued

• **Hypoprothrombinemia:** bleeding, petechiae, ecchymosis

• Clinical response: after 3 wk should include increased weight, pulse; decreased T_4

• **Bone marrow depression:** sore throat, fever, fatigue

Perform/provide:

• Limited contact with patient: ½ hr/day for each person

• Adequate rest after treatment

• Fluids to 3-4 L/day for 48 hr to remove agent from body

Evaluate:

• Therapeutic response: weight gain, decreased pulse, decreased T_4, B/P

Teach patient/family:

• To fast overnight before treatment, consume increased fluids for 48 hr after therapy

• To empty bladder often during treatment; to avoid irradiation of gonads

• To report redness, swelling, sore throat, mouth lesions; may indicate blood dyscrasias

• To avoid extended contact with children, spouse for 1 wk

• That bathroom may be used by entire family; to flush toilet several times

• To avoid coughing, expectorating for 24 hr (saliva and vomitus highly radioactive for 6-8 hr)

raloxifene (Rx)

(ral-ox'ih-feen)

Evista

Func. class.: Bone resorption inhibitor

Chem. class.: Hormone modifier, selective estrogen receptor modulator (SERM)

ACTION: Tissue-selective estrogen agonist/antagonist; agonist activity in bone and on lipid metabolism; antagonist activity on breast and uterus; reduces resorption of bone and decreases bone turnover

USES: Prevention, treatment of osteoporosis in postmenopausal women; breast cancer prophylaxis in postmenopausal women with osteoporosis or in postmenopausal women at high risk for developing the disease

Unlabeled uses: Uterine leiomyomata in postmenopausal women with osteoporosis or in postmenopausal women who are at high risk for developing the disease

CONTRAINDICATIONS: Pregnancy (X), breastfeeding, hypersensitivity

Black Box Warning: Women with active or history of venous thromboembolic events

Precautions: CV/hepatic disease, cervical/uterine cancer, elevated triglycerides, pulmonary embolism

Black Box Warning: Stroke

DOSAGE AND ROUTES

- **Adult: PO** 60 mg/day, max 60 mg/day

Available forms: Tabs 60 mg

Administer:

- PO: without regard to meals, vit D
- Add calcium supplement if inadequate

SIDE EFFECTS

CNS: Insomnia

CV: Hot flashes, peripheral edema, thromboembolism, stroke

EENT: Retinal vein occlusion (rare)

GI: *Nausea,* vomiting, diarrhea, dyspepsia

GU: Vaginitis, leukorrhea, cystitis, *hot flashes,* vaginal bleeding

INTEG: Rash, sweating

META: Weight gain, peripheral edema

MS: Arthralgia, myalgia, *leg cramps,* arthritis

RESP: Sinusitis, pharyngitis, increased cough, pneumonia, laryngitis, bronchitis, pulmonary embolism, flulike symptoms

PHARMACOKINETICS

Elimination half-life 28-32 hr; excreted in feces, breast milk; highly bound to plasma proteins

INTERACTIONS

- Administer cautiously with other highly protein-bound products, systemic estrogens

Decrease: action of anticoagulants, dessicated thyroid, levothyroxine, liotrix

Decrease: action of raloxifene—ampicillin, cholestyramine

Drug/Food

Decrease: raloxifene—soy

Drug/Lab Test

Increase: apolipoprotein A-1, hormone-binding globulin

Decrease: total cholesterol, LDL, lipoprotein, apolipoprotein B, serum calcium, albumin, total protein

NURSING CONSIDERATIONS

Assess:

Black Box Warning: History of stroke, TIA, thrombosis, atrial fibrillation, hypertension, smoking; venous thrombosis may occur, avoid prolonged sitting; discontinue 3 days before surgery, other immobilization

- Bone density test at baseline, throughout treatment, bone-specific alk phos, osteocalcin

Evaluate:

- Therapeutic response: prevention, treatment of osteoporosis in postmenopausal women; prevention of breast can-

cer in postmenopausal women with osteoporosis or in those who are at high risk for developing the disease

Teach patient/family:

Black Box Warning: To discontinue product 72 hr before prolonged bedrest; to avoid staying in one position for long periods

- To take calcium supplements, vit D if intake is inadequate
- To increase exercise using weights
- To stop smoking; to decrease alcohol consumption
- That product does not help to control hot flashes

⚠ To report fever, acute migraine, insomnia, emotional distress; urinary tract infection, vaginal burning/itching; swelling, warmth, pain in calves

⚠ To notify prescriber if pregnancy planned, suspected, pregnancy category (X); to avoid breastfeeding

raltegravir (Rx)

(ral-teg'ra-vir)

Isentress

Func. class.: Antiretroviral

Chem. class.: HIV integrase strand transfer inhibitor (ISTIs)

ACTION: Inhibits catalytic activity of HIV integrase, which is an HIV-encoded enzyme needed for replication

USES: HIV in combination with other antiretrovirals

CONTRAINDICATIONS: Breastfeeding, hypersensitivity

Precautions: Pregnancy (C), children, geriatric patients, hepatic disease, immune reconstitution syndrome, hepatitis, antimicrobial resistance, lactase deficiency

DOSAGE AND ROUTES

- **Adult and adolescent ≥16 yr: PO** 400 mg bid; if using with rifampin, give 800 mg bid; max 800 mg/day with/without food

Available forms: Tabs 400 mg

Administer:

- Do not break, crush, chew tabs
- May give without regard to meals, with 8 oz of water

SIDE EFFECTS

CNS: *Fatigue,* fever, *dizziness, headache,* asthenia, suicidal ideation

CV: MI

GI: *Nausea,* vomiting, diarrhea, abdominal pain, asthenia, gastritis, hepatitis

GU: Oliguria, proteinuria, hematuria, glomerulonephritis, acute renal failure, renal tubular necrosis

HEMA: Anemia, neutropenia

INTEG: Rash, urticaria, pruritus, pain or phlebitis at IV site, unusual sweating, alopecia

META: Hyperamylasia, hyperglycemia

MS: Myopathy, rhabdomyolysis

SYST: Immune reconstitution syndrome

PHARMACOKINETICS

Max absorption 3 hr if taken on an empty stomach; terminal half-life 9 hr; metabolized in the liver by uridine diphosphate glucuronosyltransferase (UGT A1A enzyme system); excreted in feces 51%, urine 32%

INTERACTIONS

Increase: raltegravir effect—proton pump inhibitors, H_2 blockers; UGT1A1 inhibitors (atazanavir)

⚠ **Increase:** rhabdomyolysis, myopathy, elevated CPK—fibric acid derivatives, HMG-CoA reductase inhibitors

Decrease: raltegravir levels—rifampin, efavirenz, tenofovir, tipranavir/ritonavir

Drug/Lab Test

Increase: AST, ALT, GGT, total bilirubin, alk phos, amylase/lipase, CK, serum glucose, total/HDL/LDL cholesterol

Decrease: Hgb, platelets, ANC

NURSING CONSIDERATIONS

Assess:

- **HIV infection:** CD4, T-cell count, plasma HIV RNA, viral load; resistance testing before therapy, at treatment failure
- **Rhabdomyolysis:** Assess for calf pain, increased CPK, product should be discontinued
- Skin eruptions: rash, urticaria, itching
- **Suicidal thoughts/behaviors:** monitor for depression; more common in those with mental illness
- Immune reconstitution syndrome, usually during initial phase of treatment, may give anti-infective before starting
- Monitor total/HDL/LDL cholesterol baseline and periodically, all may be elevated

Perform/provide:

- Storage at room temp

Evaluate:

- Therapeutic response: improvement in CD4 counts, T-cell counts

Teach patient/family:

- To take as prescribed; if dose missed, to take as soon as remembered up to 1 hr before next dose; not to double dose; not to share with others
- That sexual partners need to be told that patient has HIV; that product does not cure infection, just controls symptoms, does not prevent infecting others
- To report sore throat, fever, fatigue (may indicate superinfection)
- That product must be taken in equal intervals 2×/day to maintain blood levels for duration of therapy
- To notify prescriber immediately of suicidal thoughts/behaviors
- To notify prescriber if pregnancy planned, suspected; to avoid breastfeeding
- To continue with follow-up exams, blood work

ramelteon (Rx)

(rah-mel'tee-on)

Rozerem

Func. class.: Sedative/hypnotic, antianxiety

Chem. class.: Melatonin receptor agonist

ACTION: Binds selectively to melatonin receptors (MT_1, MT_2); thought to be involved in circadian rhythms and in the normal sleep/wake cycle

USES: Insomnia (difficulty with sleep onset)

CONTRAINDICATIONS: Breastfeeding, children, infants, hypersensitivity, alcohol intoxication, hepatic encephalopathy

Precautions: Pregnancy (C), hepatic disease, alcoholism, COPD, seizure disorder, sleep apnea, suicidal ideation, angioedema, depression, sleep-related behaviors (sleepwalking), schizophrenia, bipolar disorder

DOSAGE AND ROUTES

- **Adult: PO** 8 mg at bedtime

Hepatic dose

- Do not use with severe hepatic disease; use with caution for mild to moderate hepatic disease

Available forms: Tabs 8 mg

Administer:

- Within 30 min of bedtime for sleeplessness; on empty stomach for fast onset
- Do not break tabs, swallow whole

SIDE EFFECTS

CNS: Dizziness, somnolence, fatigue, headache, insomnia, depression, complex sleep-related reactions (sleep driving, sleep eating), suicidal thoughts/behaviors

GI: Nausea, diarrhea, dysgeusia, vomiting

MISC: Myalgia, arthralgia, decreased blood cortisol, influenza, upper RI

R

SYST: Severe allergic reactions, angioedema

PHARMACOKINETICS

Absorbed rapidly; peak 0.75 hr; protein binding 82%; rapid first pass metabolism via liver; 84% excreted in urine, 4% in feces; half-life 2-5 hr

INTERACTIONS

⚠ Possible toxicity: antiretroviral protease inhibitors

⚠ **Increase:** ramelteon effect, toxicity—alcohol; CYP1A2 inhibitors, azole antifungals (ketoconazole, fluconazole), fluvoxaMINE, anxiolytics, sedatives, hypnotics, barbiturates, ciprofloxacin

Decrease: effect of ramelteon—rifampin

Drug/Food

• Prolonged absorption, sleep onset reduced: high-fat/heavy meal

NURSING CONSIDERATIONS

Assess:

⚠ **Severe hypersensitive reactions:** Assess for angioedema (facial swelling), product should be discontinued

• **Sleep characteristics:** type of sleep problem: falling asleep, staying asleep; complex sleep disorders (sleep walking/driving/eating) after taking product

• Mental status: mood, sensorium, affect, memory (long, short term), suicidal ideation

• LFTs: before treatment, periodically

Perform/provide:

• Storage in tight container in cool environment

Evaluate:

• Therapeutic response: ability to sleep at night, decreased amount of early morning awakening

Teach patient/family:

• To avoid driving, other activities requiring alertness until product stabilized, drowsiness may continue the next day

• To avoid alcohol ingestion, CNS depressants

• About alternative measures to improve sleep: reading, exercise several hr before bedtime, warm bath, warm milk, TV, self-hypnosis, deep breathing

• To report if pregnancy is planned or suspected (C), avoid breastfeeding

• To take product immediately before going to bed

• Not to ingest a high-fat/heavy meal before taking product

⚠ To report cessation of menses, galactorrhea (women), decreased libido, infertility, worsening of insomnia, behavioral changes, severe allergic reactions, suicidal thoughts/behaviors, if insomnia gets worse

• Med guide should be given to patient and reviewed

ramipril (Rx)

(ra-mi'pril)

Altace

Func. class.: Antihypertensive

Chem. class.: Angiotensin-converting enzyme inhibitor (ACE)

Do not confuse:

ramipril/enalapril

Altace/alteplase

ACTION: Selectively suppresses renin-angiotensin-aldosterone system; inhibits ACE, prevents conversion of angiotensin I to angiotensin II; results in dilation of arterial, venous vessels

USES: Hypertension, alone or in combination with thiazide diuretics; CHF (post-MI), reduction in risk for MI, stroke, death from CV disorders

Unlabeled uses: Proteinuria due to diabetic nephropathy

CONTRAINDICATIONS: Breastfeeding, children, hypersensitivity to ACE inhibitors, history of ACE-inhibitor–induced angioedema

Black Box Warning: Pregnancy (D) 2nd/3rd trimesters

Precautions: Geriatric patients, impaired renal/hepatic function, dialysis

patients, hypovolemia, blood dyscrasias, CHF, COPD, asthma, renal artery stenosis, cough, African American patients

DOSAGE AND ROUTES

Hypertension

• **Adult: PO** 2.5 mg/day initially then 2.5-20 mg/day divided bid or daily

CHF post-MI

• **Adult: PO** 1.25-2.5 mg bid; may increase to 5 mg bid

Reduction in risk for MI, stroke, death

• **Adult: PO** 2.5 mg/day × 7 days then 5 mg/day × 21 days, then may increase to 10 mg/day

Renal dose

• **Adult: PO** CCr <40 ml/min, reduce by 50%, titrate upward to max 5 mg/day

Proteinuria due to diabetic nephropathy (unlabeled)

• **Adult: PO** 2.5 mg/day up to 20 mg/day

Available forms: Caps 1.25, 2.5, 5, 10 mg

Administer:

• Without regard to meals

• Caps can be opened, added to food, mixture is stable for 24 hr at room temperature, 48 hr refrigerated

SIDE EFFECTS

CNS: *Headache, dizziness,* anxiety, insomnia, paresthesia, *fatigue,* depression, malaise, vertigo

CV: *Hypotension,* chest pain, palpitations, angina, syncope, dysrhythmia, heart failure, MI

EENT: Hearing loss

GI: *Nausea,* constipation, vomiting, dyspepsia, dysphagia, anorexia, diarrhea, abdominal pain, hepatitis, hepatic failure, pancreatitis, hepatic necrosis

GU: Proteinuria, increased BUN, creatinine, impotence

HEMA: Decreased Hct, Hgb, eosinophilia, leukopenia, pancytopenia, thrombocytopenia, agranulocytosis (rare)

INTEG: Rash, sweating, photosensitivity, pruritus

META: *Hyperkalemia,* hyperglycemia

MISC: Angioedema, toxic epidermal necrolysis, anaphylaxis, Stevens-Johnson syndrome

MS: Arthralgia, arthritis, myalgia

RESP: *Cough,* dyspnea

PHARMACOKINETICS

Bioavailability >50%-60%, onset 1-2 hr, peak 3-6 hr, duration 24 hr, protein binding 73%, half-life 1-2 hr, 9-18 hr for active metabolite, metabolized by liver (metabolites excreted in urine, feces)

INTERACTIONS

Increase: hypotension—diuretics, other antihypertensives, ganglionic blockers, adrenergic blockers, nitrates, acute alcohol ingestion

⚠ Increase: toxicity—vasodilators, hydrALAZINE, prazosin, potassium-sparing diuretics, sympathomimetics, potassium supplements

Increase: serum levels of lithium

Decrease: absorption—antacids

Decrease: antihypertensive effect—indomethacin, NSAIDs, salicylates

Drug/Herb

Increase: antihypertensive effect—hawthorn

Decrease: antihypertensive effect—ephedra

Drug/Food

Increase: hyperkalemia—potassium salt substitutes, avoid use

Drug/Lab Test

Increase: LFTs, BUN, creatinine, glucose, potassium

Decrease: RBC, Hgb, platelets

NURSING CONSIDERATIONS

Assess:

⚠ Collagen-vascular disease (SLE, scleroderma): neutrophils, decreased platelets; WBC with differential at baseline, periodically; if neutrophils <1000/mm³, discontinue treatment

• **Hypertension:** Monitor B/P baseline and regularly, orthostatic hypotension, syncope

• Potassium levels; hyperkalemia occurs

R

- **Renal disease:** protein, BUN, creatinine, potassium, sodium at baseline, periodically; increased levels may indicate nephrotic syndrome; renal symptoms: polyuria, oliguria, urinary frequency, dysuria
- **CHF:** edema in feet, legs daily; weight daily

⚠ **Serious allergic reactions:** angioedema, Stevens-Johnson syndrome, rash, fever, pruritus, urticaria; product should be discontinued if antihistamines fail to help

- Monitor electrolytes baseline and periodically, potassium may be increased

Perform/provide:

- Storage in tight container at ≤86° F (30° C)

Evaluate:

- Therapeutic response: decrease in B/P; CHF

Teach patient/family:

- Not to discontinue product abruptly; to comply with dosage schedule, even if feeling better
- Not to use OTC products (cough, cold, allergy) unless directed by prescriber; not to use salt substitutes containing potassium without consulting prescriber
- To rise slowly to sitting or standing position to minimize orthostatic hypotension

⚠ To notify prescriber of mouth sores, sore throat, fever, swelling of hands or feet, irregular heartbeat, chest pain

- To report excessive perspiration, dehydration, vomiting, diarrhea; may lead to fall in B/P
- That product may cause dizziness, fainting, lightheadedness; that these may occur during first few days of therapy
- That product may cause skin rash, impaired perspiration
- How to take B/P, normal readings for age group

Black Box Warning: To inform prescriber if pregnancy planned, suspected, pregnancy category (D); not to breastfeed

TREATMENT OF OVERDOSE:

0.9% NaCl IV inf, hemodialysis

ranibizumab (Rx)

(ran-ih-biz'oo-mab)

Lucentis

Func. class.: Ophthalmic

Chem. class.: Selective vascular endothelial growth factor antagonist

ACTION: Binds to receptor-binding site of active forms of vascular endothelial growth factor A (VEGF-A) that causes angiogenesis and cell proliferation

USES: Macular degeneration (neovascular) (wet), macular edema after retinal vein occlusion (RVO), diabetic macular edema

CONTRAINDICATIONS: Hypersensitivity, ocular infections

Precautions: Pregnancy (C), breastfeeding, children, retinal detachment, increased intraocular pressure

DOSAGE AND ROUTES

Macular degeneration/macular edema after retinal vein occlusion (RVO)

- **Adult: INTRAVITREAL** 0.5 mg (0.05 ml) monthly

Diabetic macular edema

- **Adults: INTRAVITREAL** 0.5 mg then prompt (within 1 wk) or deferred (≥24 wk) laser

Available forms: Sol for inj 0.5 mg/0.05 ml

Administer:

- By ophthalmologist via intravitreal injection using adequate anesthesia; use 19-gauge filter

SIDE EFFECTS

CNS: Dizziness, headache

EENT: Blepharitis, cataract, conjunctival hemorrhage/hyperemia, detachment of retinal pigment epithelium, dry/irritation/pain in eye, visual impairment, vitreous floaters, ocular infection

GI: Constipation, nausea

MISC: Hypertension, UTI, thromboembolism, nonocular bleeding
RESP: Bronchitis, cough, sinusitis, URI

PHARMACOKINETICS

Elimination half-life 9 days

INTERACTIONS

Increase: severe inflammation—verteporfin photodynamic therapy (PDT)

NURSING CONSIDERATIONS

Assess:
• **Eye changes:** redness; sensitivity to light, vision change; increased intraocular pressure change; report infection to ophthalmologist immediately
Perform/provide:
• Storage in refrigerator; do not freeze
• Protect from light
Evaluate:
• Therapeutic response: prevention of increasing macular degeneration
Teach patient/family:
• That, if eye becomes red, sensitive to light, painful, or if there is a change in vision, to seek immediate care from ophthalmologist
• About reason for treatment, expected results

ranitidine (Rx, OTC)
(ra-nit'i-deen)
Equaline Heartburn Relief, Nu-Ranit ♣, Top Care Heartburn Relief, Wal-zan, Zantac, Zantac C ♣

ranitidine bismuth citrate
Tritec

Func. class.: H_2-Histamine receptor antagonist

Do not confuse:
ranitidine/amantadine/rimantadine
Zantac/Xanax/Zofran/ZyrTEC

ACTION: Inhibits histamine at H_2-receptor site in parietal cells, which inhibits gastric acid secretion

USES: Duodenal ulcer, Zollinger-Ellison syndrome, gastric ulcers, hypersecretory conditions, gastroesophageal reflux disease, stress ulcers, erosive esophagitis (maintenance), active duodenal ulcers with *Helicobacter pylori* in combination with clarithromycin, systemic mastocytosis, multiple endocrine adenoma syndrome, heartburn
Unlabeled uses: Prevention of aspiration pneumonitis, upper GI bleeding, angioedema, gastritis, urticaria, NSAID-induced ulcer prophylaxis

CONTRAINDICATIONS: Hypersensitivity
Precautions: Pregnancy (B), breastfeeding, child <12 yr, renal/hepatic disease

DOSAGE AND ROUTES

Ranitidine

Duodenal ulcer
• **Adult: PO** 150 mg bid or 300 mg/day after PM meal or at bedtime; maintenance 150 mg at bedtime
• **Infant and child: PO** 2-4 mg/kg bid, max 300 mg/day
Zollinger-Ellison syndrome
• **Adult: PO** 150 mg bid, may increase if needed
Gastric ulcer
• **Adult: PO** 150 mg bid × 6 wk then 150 mg at bedtime
• **Infant and child: PO** 2-4 mg/kg bid, max 300 mg/day
GERD
• **Adult: PO** 150 mg bid
Erosive esophagitis
• **Adult: PO** 150 mg qid for up to 12 wk
• **Child ≥1 mo: PO** 5-10 mg/kg/day in 2-3 divided doses
Renal dose
• **Adult:** CCr <50 ml/min, give 50% of dose or extend dosing interval

R

NSAID-induced ulcer prophylaxis (unlabeled)

• **Adult: PO** 150 mg bid

Stress gastritis prophylaxis (unlabeled)

• **Adult: IM/INT IV INF** 50 mg q6-8hr

Severe, acute urticaria/angioedema (unlabeled)

• **Adult: INT IV INF** 50 mg with H_1-blocker

Ranitidine bismuth citrate

• **Adult: PO** 400 mg bid × 4 wk with clarithromycin 500 mg tid × 1st 2 wk

Available forms: *Ranitidine:* tabs 75, 150, 300 mg; sol for inj 25 mg/ml; caps 150, 300 mg; syr 15 mg/ml; *ranitidine bismuth citrate:* tabs 400 mg

Administer:

PO route

• Antacids 1 hr before or 1 hr after ranitidine

• Without regard to meals; **EFFERdose tab:** dissolve 25 mg/≥5 ml, give after dissolved; swallow whole or dissolve on tongue, do not chew

IM route

• No dilution needed; inject in large muscle mass, aspirate

Direct IV route

• Dilute to max 2.5 mg/ml (50 mg/20 ml) using 0.9% NaCl (nonpreserved) or D_5W, give dose over ≥5 min (max 4 mg/ml)

Intermittent IV INF route

• Dilute to max 0.5 mg/ml with D_5W, NS, give over 15-20 min (5-7 ml/min); premixed ready-to-use bags as 1 mg/ml (50 mg/50 ml), inf over 15-20 min

Continuous 24 hr IV INF route

• dilute 150 mg/250 ml of D**Adult:** $_5$W or NS, run over 24 hr (6.25 mg/hr or as directed); use inf device, use within 48 hr; *Zollinger-Ellison Syndrome:* dilute in D_5W, NS; max conc 2.5 mg/ml, use inf device

Y-site: Acyclovir, aldesleukin, alemtuzumab, alfentanil, allopurinol, amifostine, amikacin, aminophylline, amphotericin B liposome, amsacrine, anikinra, anidulafungin, ascorbic acid, atracurium, atropine, aztreonam, bivalirudin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, ceFAZolin, cefepime, cefonicid, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, cefTAZidime, ceftizoxime, ceftRIAXone, cefuroxime, chloramphenicol, chlorproMAZINE, cimetidine, ciprofloxacin, cisatracurium, CISplatin, clindamycin, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, dexmedetomidine, digoxin, diltiazem, DOBUTamine, DOCEtaxel, DOPamine, doripenem, doxacurium, doxapram, DOXOrubicin, DOXOrubicin liposome, doxycycline, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, epoetin alfa, ertapenem, erythromycin, esmolol, etoposide, etoposide phosphate, famotidine, fenoldopam, fentaNYL, filgrastim, fluconazole, fludarabine, fluorouracil, folic acid, foscarnet, furosemide, ganciclovir, gemcitabine, gentamicin, glycopyrrolate, granisetron, heparin, hydrocortisone, HYDROmorphone, IDArubicin, ifosfamide, imipenem/cilastatin, inamrinone, indomethacin, isoproterenol, ketorolac, labetalol, levofloxacin, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, melphalan, meperidine, metaraminol, methotrexate, methoxamine, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, midazolam, milrinone, mitoXANtrone, morphine, multivitamin, nalbuphine, naloxone, nesiritide, niCARdipine, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxacillin, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pancuronium, papaverine, PEMEtrexed, penicillin G, pentamidine, pentazocine, PENTobarbital, PHENobarbital, phentolamine, phenylephrine, phytonadione, piperacillin/tazobactam, potassium chloride, procainamide, prochlorperazine, promethazine, propofol, propranolol, protamine, pyridoxime, remifentanil, riTUXimab, rocuronium, sargramostim, sodium

acetate/bicarbonate, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiamine, thiopental, thiotepa, ticarcillin/clavulanate, tigecycline, tirofiban, tobramycin, tolazoline, trastuzumab, trimethaphan, urokinase, vancomycin, vecuronium, vinCRIStine, vinorelbine, warfarin, zidovudine, zoledronic acid

SIDE EFFECTS

CNS: Headache, sleeplessness, dizziness, confusion, agitation, depression, hallucination (geriatric patients)
CV: Tachycardia, bradycardia, PVCs
EENT: Blurred vision, increased ocular pressure
GI: Constipation, abdominal pain, diarrhea, nausea, vomiting, hepatotoxicity
GU: Impotence, acute interstitial nephritis (rare)
INTEG: Urticaria, rash, fever
RESP: Pneumonia
SYST: Anaphylaxis (rare)

PHARMACOKINETICS

PO: Peak 2-3 hr; duration 8-12 hr; metabolized by liver; excreted in urine (30% unchanged, PO), breast milk; half-life 2-3 hr; protein binding 15%

INTERACTIONS

Increase: effect of pramipexole, procainamide, trospium, triazolam, calcium channel blockers, memantine, saquinavir, adefovir
⚠ Increase: GI obstruction risk—NIFEdipine ext rel products
Increase: toxicity—sulfonylureas, procainamide, benzodiazepines, calcium channel blockers
Decrease: absorption of ranitidine—antacids, anticholinergics
Decrease: effects of cephalosporins, iron salts, ketoconazole, itraconazole
Increase: GI obstruction risk—NIFEdipine ext rel products
Drug/Lab Test
Increase: AST, ALT, creatinine
False positive: urine protein (Multistix)

NURSING CONSIDERATIONS

Assess:
- **GI complaints:** nausea, vomiting, diarrhea, cramps, abdominal discomfort, jaundice; report immediately
- I&O ratio, BUN, creatinine, LFTs, serum, stool guaiac before, periodically during therapy

Perform/provide:
- Storage at room temp

Evaluate:
- Therapeutic response: decreased abdominal pain, heartburn

Teach patient/family:
- To avoid driving, other hazardous activities until stabilized on product
- That product must be continued for prescribed time to be effective
- To notify prescriber if pregnancy planned, suspected; to avoid breastfeeding
- Not to take maximum OTC daily dose for >2 wk
- To take once daily dose before bedtime

ranolazine (Rx)

(ruh-no'luh-zeen)
Ranexa
Func. class: Antianginal

ACTION: Antianginal, antiischemic; unknown, may work by inhibiting portal fatty-acid oxidation

USES: Chronic stable angina pectoris; use in patients who have not responded to other treatment options; should be used in combination with other antianginals such as amlodipine, β-blockers, nitrates

CONTRAINDICATIONS: Preexisting QT prolongation, hepatic disease (Child-Pugh class A, B, C), hypersensitivity, hypokalemia, renal failure, torsades de pointes, ventricular dysrhythmia, ventricular tachycardia, hepatic cirrhosis

R

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, hypotension, renal disease

DOSAGE AND ROUTES

• **Adult: PO** 500 mg bid, increased to 1000 mg bid based on response; max 1000 mg bid

Available forms: Ext rel tabs 500, 1000 mg

Administer:

• **Ext rel tabs:** do not break, crush, chew tabs; take product as prescribed; do not double or skip dose

• Without regard to meals, bid; do not use with grapefruit juice

SIDE EFFECTS

CNS: *Headache, dizziness*

CV: Palpitations, QT prolongation

GI: Nausea, vomiting, constipation, dry mouth

MISC: Peripheral edema

RESP: Dyspnea

PHARMACOKINETICS

Absorption varied; peak 2-5 hr; half-life 7 hr; extensively metabolized by the liver (CYP3A and less by CYP2D6); excreted in urine (75%), feces (25%); protein binding 62%

INTERACTIONS

Increase: ranolazine action—diltiazem, ketoconazole, macrolide antibiotics, dofetilide, PARoxetine, protease inhibitors, quiNIDine, sotalol, thioridazine, verapamil, ziprasidone

Increase: action of digoxin, simvastatin

Increase: ranolazine absorption, toxicity—antiretroviral protease inhibitors

⚠ **Increase:** QT prolongation and torsades de pointes—class IA/III antidysrythmics, arsenic trioxide, chloroquine, droperidol, haloperidol, levomethadyl, methadone, pentamidine, chlorproMAZINE, mesoridazine, thioridazine, pimozide; CYP3A4 inhibitors (ketoconazole, fluconazole, itraconazole, IV miconazole, voriconazole, diltiazem, verapamil)

Drug/Food

• Do not use with grapefruit, grapefruit juice

NURSING CONSIDERATIONS

Assess:

• **Angina:** characteristics of pain (intensity, location, duration, alleviating/precipitating factors)

⚠ **QT prolongation:** ECG for QT prolongation, ejection fraction; assess for chest pain, palpitations, dyspnea

• Cardiac status: B/P, pulse, respirations

• LFTs, serum creatinine/BUN, magnesium, potassium before treatment, periodically

Evaluate:

• Therapeutic response: decreased anginal pain

Teach patient/family:

• To avoid hazardous activities until stabilized on product, dizziness no longer a problem

⚠ To avoid OTC drugs, grapefruit juice, products prolonging QTc (quiNIDine, dofetilide, sotalol, erythromycin, thioridazine, ziprasidone or protease inhibitors, diltiazem, ketoconazole, macrolide antibiotics, verapamil) unless directed by prescriber; to notify prescriber of palpitations, fainting

• To comply with all areas of medical regimen

• To take as directed; not to skip dose, double doses

• Not to chew or crush, not to use with grapefruit juice

• To notify all health care providers of product use

• To notify prescriber of palpitations, dizziness, edema, dyspnea

• For acute angina, take other products prescribed, this product does not decrease acute attack

rasagiline (Rx)

(ra-sa'ji-leen)

Azilect

Func. class.: Antiparkinson agent

Chem. class.: MAOI, type B

ACTION: Inhibits MAOI type B at recommended doses; may increase DOPamine levels

USES: Idiopathic Parkinson's disease monotherapy or with levodopa

CONTRAINDICATIONS: Breastfeeding; hypersensitivity to this product, MAOIs; pheochromocytoma

Precautions: Pregnancy (C), children, psychiatric disorders, moderate to severe hepatic disorders

DOSAGE AND ROUTES

Monotherapy

• **Adult: PO** 1 mg/day

Adjunctive therapy

• **Adult: PO** 0.5 mg/day, may increase 1 mg/day; change of levodopa dose for adjunct therapy; reduced levodopa dose may be needed

Hepatic dose

• **Adult: PO** 0.5 mg for mild hepatic disease

Concomitant ciprofloxacin, other CYP1A2 inhibitors

• **Adult: PO** 0.5 mg; plasma concentrations of rasagiline may double

Available forms: Tabs 0.5, 1 mg

Administer:

⚠ With meals to prevent nausea; continuing therapy usually reduces or eliminates nausea; do not give with foods/liquids containing large amounts of tyramine

• Reduced dose of carbidopa/levodopa cautiously

• Renal failure: in dialysis, increase dose slowly

SIDE EFFECTS

CNS: Drowsiness, hallucinations, depression, headache, malaise, paresthesia, vertigo, syncope

CV: Angina, hypertensive crisis (ingestion of tyramine products), orthostatic hypotension

GI: *Nausea*, diarrhea, dry mouth, dyspepsia

GU: Impotence, decreased libido

HEMA: Leukopenia

INTEG: Alopecia, skin cancers

MISC: Conjunctivitis, fever, flu syndrome, neck pain, allergic reaction, alopecia

MS: Arthralgia, arthritis, dyskinesia

RESP: Rhinitis

PHARMACOKINETICS

Onset, peak, duration unknown; well absorbed; protein binding >88%-94%; metabolized by CYP1A2 in liver; excreted by kidneys

INTERACTIONS

⚠ Do not give with meperidine, other analgesics because serious reactions (including coma and death) may occur; do not give with sympathomimetics

Increase: levels of rasagiline up to 2-fold—ciprofloxacin, CYP1A2 inhibitors (atazanavir, mexiletine, taurine)

Increase: severe CNS toxicity with antidepressants (tricyclics, SSRIs, SNRIs, mirtazapine, cyclobenzaprine)

⚠ **Increase:** hypertensive crisis—MAOIs

Drug/Herb

• Do not give with St. John's wort, yohimbe

Drug/Food

• Do not give with foods/liquids that have large amounts of tyramine

Drug/Lab Test

Increase: LFTs

Decrease: WBCs

NURSING CONSIDERATIONS

Assess:

• **Parkinson's symptoms:** tremor, ataxia, muscle weakness and rigidity at

R

baseline, periodically; increased dyskinesia, postural hypotension if used in combination with levodopa

- Mental status: hallucinations, confusion, notify prescriber

Hypertensive crisis: severe headache, blurred vision, seizures, chest pain, difficulty thinking, nausea, vomiting, signs of stroke; any unexplained severe headache should be considered to be hypertensive crisis

Melanomas; periodic skin exams by a dermatologist

- Cardiac status: B/P, ECG periodically during beginning treatment

Tyramine products: foods, other medications may lead to hypertensive crisis (tachycardia, bradycardia, chest pain, nausea, vomiting, sweating, dilated pupils)

Evaluate:

- Therapeutic response: improved symptoms in patients with Parkinson's disease

Teach patient/family:

- To change positions slowly to prevent orthostatic hypotension
- To avoid hazardous activities until stabilized on product; that dizziness can occur
- To rinse mouth frequently; to use sugarless gum to alleviate dry mouth
- To take as prescribed; not to miss dose or double doses; to take missed dose as soon as remembered if several hours before next dose

To prevent hypertensive crisis by avoiding high-tyramine foods (>150 mg)

- To report signs of hypertensive crisis
- To avoid CNS depressants, alcohol
- To notify all providers of product use; to avoid elective surgery, other procedures involving CNS depressants

rasburicase (Rx)

(rass-burr'i-case)

Elitek, Fasturtec ♣

Func. class.: Enzyme

Chem. class.: Recombinant urate-oxidase enzyme

ACTION: Catalyzes enzymatic oxidation of uric acid into an inactive and soluble metabolite (allantoin)

USES: To reduce uric acid levels in children with leukemia, lymphoma, solid tumor malignancies who are receiving chemotherapy

CONTRAINDICATIONS: Hypersensitivity

Black Box Warning: G6PD deficiency (Mediterranean, African descendants), hemolytic reactions, methemoglobinemia reactions to product

Precautions: Pregnancy (C), breastfeeding, children <2 yr, anemia

Black Box Warning: Acute bronchospasm, angina, angioedema, atony, African-American and Mediterranean patients, hypotension, urticaria

DOSAGE AND ROUTES

- **Adult/adolescent/infant: IV INF** 0.2 mg/kg as single daily dose given as **IV INF** over $^1/_2$ hr × 5 days

Available forms: Powder for inj 1.5, 7.5 mg/vial

Administer:

Intermittent IV INF route

- Reconstitute with diluent provided, add 1 ml of diluent/each vial, swirl, withdraw amount needed, mix with NS to final volume of 50 ml, use within 24 hr, give over 30 min, do not use filter, use different line; if not possible, flush with ≥15 ml of saline before, after use
- Chemotherapy started 4-24 hr after 1st dose

SIDE EFFECTS

CNS: *Headache,* fever
CV: Chest pain, hypotension
GI: *Nausea, vomiting, anorexia, diarrhea, abdominal pain, constipation, dyspepsia, mucositis*
HEMA: Neutropenia with fever, hemolysis, methemoglobinemia
INTEG: *Rash*
MISC: Edema
RESP: Bronchospasm, wheezing, dyspnea
SYST: Anaphylaxis, hemolysis, methemoglobinemia, sepsis

PHARMACOKINETICS

Elimination half-life 16-21 hr

INTERACTIONS

⚠ **Increase:** toxicity—allopurinol

NURSING CONSIDERATIONS

Assess:
• Blood studies: BUN, serum uric acid, urine creatinine clearance, electrolytes, CBC with differential before, during therapy
• Monitor temp; fever may indicate beginning infection; no rectal temps
⚠ **Anaphylaxis:** dyspnea, urticaria, flushing, wheezing, swelling of lips, tongue, throat; have emergency equipment nearby
⚠ **G6PD deficiency, hemolytic reactions, methemoglobinemia;** these patients should not be given this product; screen patients who are at higher risk for these disorders
• GI symptoms: frequency of stools, cramping; if severe diarrhea occurs, fluid, electrolytes may need to be given
Evaluate:
• Therapeutic response: decreased uric acid levels in children when antineoplastics causing high uric acid levels used
Teach patient/family:
• About the reason for therapy, expected results
⚠ To report trouble breathing, jaundice, chest pain

⚠ **HIGH ALERT**

remifentanil (Rx)

(rem-ih-fin'ta-nill)
Ultiva
Func. class.: Opiate agonist analgesic
Chem. class.: μ-Opioid agonist

Controlled Substance Schedule II

ACTION: Inhibits ascending pain pathways in limbic system, thalamus, midbrain, hypothalamus

USES: In combination with other products for general anesthesia to provide analgesia

CONTRAINDICATIONS: Hypersensitivity
Precautions: Pregnancy (C), breastfeeding, children <12 yr, geriatric patients, increased intracranial pressure, acute MI, severe heart disease, GI/renal/hepatic disease, asthma, respiratory conditions, seizures disorders, bradyarrhythmias

DOSAGE AND ROUTES

• **Adult:** Induction **IV** 0.5-1 mcg/kg/min with hypnotic or volative agent; maintenance with isoflurane (0.4-1.5 MAC) or propofol (100-200 mcg/kg/min); **CONT INF** 0.25-0.4 mcg/kg/min
• **Child 1-12 yr: CONT IV INF** 0.25 mcg/kg/min with isoflurane
• **Full-term neonate and infant up to 2 mo: CONT IV INF** 0.4 mcg/kg/min with nitrous oxide
Available forms: Powder for inj lyophilized 1, 2, 5 mg
Administer:
• Add 1 ml diluent per mg remifentanil
• Shake well; further dilute to a final concentration of 20, 25, 50 or 250 mcg/mg

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• Interruption of inf results in rapid reversal (no residual opioid effect within 5-10 min)

Direct IV route

• To be used only during maintenance of general anesthesia; inject into tubing close to venous cannula; give to nonintubated patients over 30-60 sec

Continuous IV INF route

• Use inf device, max 16 hr; do not use same tubing as blood, do not admix

Y-site compatibilities: Acyclovir, alfentanil, amikacin, aminophylline, ampicillin, ampicillin/sulbactam, aztreonam, bumetanide, buprenorphine, butorphanol, calcium gluconate, ceFAZolin, cefepine, cefotaxime, cefoTEtan, cefOXitin, cefTAZidime, ceftizoxime, cefTRIAXone, cefuroxime, cimetidine, ciprofloxacin, cisatracurium, clindamycin, dexamethasone, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOPamine, doxacurium, doxycycline, droperidol, enalaprilat, EPINEPHrine, esmolol, famotidine, fentaNYL, fluconazole, furosemide, ganciclovir, gatifloxacin, gentamicin, haloperidol, heparin, hydrocortisone sodium succinate, HYDROmorphone, hydrOXYzine, imipenem-cilastatin, inamrinone, isoproterenol, ketorolac, lidocaine, LORazepam, magnesium sulfate, mannitol, meperidine, methylPREDNISolone sodium succinate, metoclopramide, metroNIDAZOLE, midazolam, morphine, nalbuphine, nitroglycerin, norepinephrine, ondansetron, phenylephrine, piperacillin, potassium chloride, procainamide, prochlorperazine, promethazine, ranitidine, SUFentanil, theophylline, thiopental, ticarcillin/clavulanale, tobramycin, vancomycin, zidovudine

Solution compatibilities: D_5, 0.45% NaCl, LR, D_5 LR, 0.9% NaCl

SIDE EFFECTS

CNS: Drowsiness, *dizziness,* confusion, *headache,* sedation, euphoria, delirium, agitation, anxiety

CV: Palpitations, *bradycardia,* change in B/P, facial flushing, syncope, asystole

EENT: Tinnitus, blurred vision, miosis, diplopia

GI: *Nausea, vomiting,* anorexia, constipation, cramps, dry mouth

GU: Urinary retention, dysuria

INTEG: Rash, urticaria, bruising, flushing, diaphoresis, pruritus

MS: Rigidity

RESP: Respiratory depression, apnea

PHARMACOKINETICS

70% protein binding, terminal half-life 3-10 min, excreted in urine; onset: 1-3 min

INTERACTIONS

Increase: respiratory depression, hypotension, profound sedation: alcohol, sedatives, hypnotics, other CNS depressants; antihistamines, phenothiazines, MAOIs

Drug/Herb

Increase: CNS depression—kava

NURSING CONSIDERATIONS

Assess:

• I&O ratio; check for decreasing output; may indicate urinary retention, especially in geriatric patients

• CNS changes; dizziness, drowsiness, hallucinations, euphoria, LOC, pupil reaction

• GI status: nausea, vomiting, anorexia, constipation

• Allergic reactions: rash, urticaria

• **Respiratory dysfunction:** respiratory depression, character, rate, rhythm; notify prescriber if respirations <12/min; CV status; bradycardia, syncope

Perform/provide:

• Storage in light-resistant area at room temp

Evaluate:

• Therapeutic response: maintenance of anesthesia

Teach patient/family:

• To call for assistance when ambulating or smoking; that drowsiness, dizziness may occur

• To make position changes slowly to prevent orthostatic hypotension

repaglinide (Rx)

(re-pag'lih'nide)

Gluconorm ♣, Prandin

Func. class.: Antidiabetic

Chem. class.: Meglitinide

ACTION: Causes functioning β-cells in pancreas to release insulin, thereby leading to a drop in blood glucose levels; closes ATP-dependent potassium channels in the β-cell membrane; this leads to the opening of calcium channels; increased calcium influx induces insulin secretion

USES: Type 2 diabetes mellitus

CONTRAINDICATIONS: Hypersensitivity to meglitinides; diabetic ketoacidosis, type 1 diabetes

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, thyroid/cardiac disease, severe renal/hepatic disease, severe hypoglycemic reactions

DOSAGE AND ROUTES

• **Adult: PO** 1-2 mg with each meal, max 16 mg/day; adjust at weekly intervals; oral-hypoglycemic–naive patients or patients with A1c <8% should start with 0.5 mg with each meal

Renal/hepatic dose

• **Adult: PO** CCr 20-39 ml/min, 0.5 mg/day; titrate upward cautiously

Available forms: Tabs 0.5, 1, 2 mg

Administer:

• Up to 15-30 min before meals; 2, 3, or 4×/day preprandially

• Skip dose if meal skipped; add dose if meal added

SIDE EFFECTS

CNS: *Headache, weakness,* paresthesia

ENDO: Hypoglycemia

GI: Nausea, vomiting, diarrhea, constipation, dyspepsia

INTEG: Rash, allergic reactions

MISC: Chest pain, UTI, allergy

MS: Back pains, arthralgia

RESP: URI, sinusitis, rhinitis, bronchitis

PHARMACOKINETICS

Completely absorbed by GI route; onset 30 min; peak 1 hr; duration <4 hr; half-life 1 hr; metabolized in liver; excreted in urine, feces (metabolites); crosses placenta; 98% protein bound

INTERACTIONS

⚠ Do not use with gemfibrozil

Increase: repaglinide effect—CYP3A4, OATP101, CYP2C9 inhibitors

Increase: in both—levonorgestrel/ethinyl estradiol

Increase: repaglinide metabolism—CYP3A4 inducers: rifampin, barbiturates, carBAMazepine

Increase: repaglinide effect—NSAIDs, salicylates, sulfonamides, chloramphenicol, MAOIs, coumarins, β-blockers, probenecid, gemfibrozil, simvastatin, fenofibrate, deferasirox

Decrease: repaglinide metabolism—CYP3A4 inhibitors: antifungals (ketoconazole, miconazole), erythromycin, macrolides

Decrease: repaglinide action—calcium channel blockers, corticosteroids, oral contraceptives, thiazide diuretics, thyroid preparations, estrogens, phenothiazines, phenytoin, rifampin, isoniazid, PHENobarbital, sympathomimetics

Drug/Herb

Increase: antidiabetic effect—garlic, chromium, horse chestnut

Drug/Food

Decrease: repaglinide level; give before meals

Drug/Lab Test

Increase/decrease: glucose

NURSING CONSIDERATIONS

Assess:

⚠ **Hypo/hyperglycemic reaction,** which can occur soon after meals: dizziness, weakness, headache, tremor, anxiety, tachycardia, hunger, sweating, ab-

R

♣ Canada only

dominal pain, A1c, fasting, postprandial glucose during treatment

Perform/provide:

• Storage in tight container at room temp

Evaluate:

• Therapeutic response: decrease in polyuria, polydipsia, polyphagia; clear sensorium; absence of dizziness; stable gait; blood glucose, A1c improvement

Teach family/patient:

• About technique for blood glucose monitoring; how to use blood glucose meter

• About the symptoms of hypo/hyperglycemia, what to do about each

• That product must be continued on daily basis; about the consequences of discontinuing product abruptly

• To avoid OTC medications unless ordered by prescriber

• That diabetes is a lifelong illness; that product will not cure disease

• That all food included in diet plan must be eaten to prevent hypoglycemia; that if a meal is omitted, dose should be omitted; to have glucagon emergency kit available; to take repaglinide 15-30 min before meals 2, 3, or 4×/day; to carry emergency ID

TREATMENT OF OVERDOSE:

Glucose 25 g IV via dextrose 50% solution, 50 ml or 1 mg glucagon

retapamulin (topical)

(re-te-pam'you-lin)

Altabax

Func. class.: Topical anti-infective

Chem. class.: Pleuromutilin

ACTION: Antibacterial activity results from inhibition of protein synthesis

USES: For the treatment of impetigo

CONTRAINDICATIONS: Hypersensitivity to this product

Precautions: Children

DOSAGE AND ROUTES

• **Adult/child ≥9 mo: TOP** apply to affected area bid × 5 days

Available forms: Topical ointment 1%

Administer:

Topical route

• Do not use skin products near the eyes, nose, or mouth

• Wash hands before and after use

• **Ointment:** Apply a thin film to the cleansed affected area and massage gently into affected areas

SIDE EFFECTS

INTEG: Pruritus, irritation, headache, diarrhea, nausea

NURSING CONSIDERATIONS

Assess:

Allergic reaction

• Hypersensitivity, product may need to be discontinued

Infection

• Number of lesions, severity of impetigo

Evaluate:

• Decreased lesions, infection in impetigo

Teach patient/family:

Topical route

• Not to use skin products near the eyes, nose, or mouth

• To wash hands before and after use

• **Ointment:** To apply a thin film to the cleansed affected area

Rh$_o$(D) immune globulin standard dose IM (Rx)

BayRho-D, HyperRHO SD, RhoGAM Ultra-Filtered Plus

Rh$_o$(D) immune globulin microdose IM (Rx)

MICRhoGAM Ultra-Filtered Plus

Rh$_o$(D) immune globulin IV (Rx)

Rhophylac, WinRho SDF

Func. class.: Immune globulins

ACTION: Suppresses immune response of nonsensitized Rh$_o$(D or D^u)-negative patients who are exposed to Rh$_o$(D or D^u)-positive blood

USES: Prevention of isoimmunization in Rh-negative women given Rh-positive blood after abortions, miscarriages, amniocentesis; chronic idiopathic thrombocytopenia purpura (Rhophylac)

CONTRAINDICATIONS: Previous immunization with this product, Rh$_o$(O)-positive/D^u-positive patient

Black Box Warning: Hemolysis

Precautions: Pregnancy (C)

Black Box Warning: Requires a specialized setting

DOSAGE AND ROUTES

To reduce risk of Rh isoimmunization antepartum/ suppression of Rh isoimmunization postpartum following delivery of full-term infant

• **Adult and adolescent ≥16 yr: IM** (BayRho-D [HyperRHO SD] full dose only) 300 mcg (1500 international units) at 28 wk gestation, repeat within 72 hr of delivery of confirmed Rho(D)-positive infant; dose not needed after delivery if delivery within 3 wk of last dose and no fetal maternal hemorrhage of >15 ml of RBC; **IM** (RhoGam only) 300 mcg (1500 international units) at 26-28 wk gestation, repeat within 72 hr even if status of Rho unknown or if 72 hr have passed; **IM/IV** (WinRho SDF only) 300 mcg (1500 international units) at 28 wk gestation; if given earlier during pregnancy, give at 12-wk intervals during pregnancy, 120-mcg (600 international units) dose; IM/IV should be given as soon as possible and preferably within 72 hr of delivery of confirmed Rho(D)-positive infant and even if status unknown; give ≤ 28 days after delivery

Known or suspected massive fetomaternal hemorrhage (>15 ml of fetal RBC or >30 ml of fetal whole blood)

• **Adult and adolescent ≥16 yr: IM** (BayRho-D [HyperRHO SD] full dose only) 300 mcg (1500 international units) per every 15 ml of fetal blood cells or 30 ml of whole blood; multiple syringes may be injected IM at same time in different sites, give within 72 hr of exposure, repeat dose within 72 hr of delivery; **IM** (RhoGAM only) 300 mcg (1500 international units) for every 15 ml of fetal blood cells or 30 ml of whole blood, give total dose within 72 hr of exposure; **IM/IV** (WinRho SDF only) if large fetomaternal hemorrhage suspected, give **IV** 9 mcg (45 international units) or **IM** 12 mcg (60 international units) for every ml of fetal whole blood, give **IV** 600 mcg (3000 international units) q8hr or **IM** 1200 mcg (6000 international units) q12hr until total dose given, total dose should be given within 72 hr of exposure

Threatened abortion at any stage of pregnancy

• **Adult and adolescent ≥16 yr: IM** (BayRho-D [HyperRHO SD] full dose only) 300 mcg (1500 international units) as soon as possible; if given at 13-18 wk gestation, give another 300 mcg (1500 international units) at 26-28 wk gestation; repeat dose within 72 hr of delivery; **IM** (RhoGam only) 300 mcg (1500 international units) as soon as

R

possible and within 72 hr of exposure; **IM/IV** (Rhophylac only) 300 mcg (1500 international units) as soon as possible and within 72 hr; **IM/IV** (WinRho SDF only) 300 mcg (1500 international units) as soon as possible and within 72 hr, repeat dose at 12-wk intervals during pregnancy and give 120 mcg (600 international units) as soon as possible after delivery and within 72 hr

After spontaneous abortion, induced termination of pregnancy, or ectopic pregnancy that occurs at ≤12 wk gestation

• **Adult and adolescent ≥16 yr: IM** (BayRho-D Minidose, HyperRHO Minidose, MICRhoGAM only) 50 mcg (250 international units) as soon as possible, give within 3 hr of spontaneous or surgical removal, if possible within 72 hr

After spontaneous abortion, induced termination of pregnancy, or ruptured tubal pregnancy that occurs at ≥13 wk

• **Adult and adolescent ≥16 yr: IM** (BayRho-D [HyperRHO SD] full dose, RhoGAM only) 300 mcg (1500 international units) as soon as possible and within 72 hr of event

After spontaneous abortion, induced termination of pregnancy, amniocentesis, chorionic villus sampling, abdominal trauma, ruptured tubal pregnancy, or percutaneous umbilical cord sampling at ≤34 wk gestation

• **Adult and adolescent ≥16 yr: IM/IV** (WinRho SDF only) 300 mcg (1500 international units) within 72 hr, repeat at 12-wk intervals during pregnancy, give 120 mcg (600 international units) as soon as possible and preferably within 72 hr of delivery

Available forms: BayRho-D sol for inj 300 mcg/ml (HyperRHO SD sol for inj), MICRhoGAM Ultra Filtered Plus Solution for inj 50 mcg/ml; RhoGam Ultra Filtered Plus Solution for inj 50 mcg; Rhophylac Pre-Filled Syringes Solution for inj 300 mcg/2 ml; WinRho SDF liquid for inj; WinRho powder for inj

Administer:

• BayRho-D (HyperRHO SD), MICRhoGAM, RhoGAM given by IM only; do not give IV

• WinRho SDF and Rhophylac can be given IM or IV

• Inspect for particulate matter; do not use if particulate matter present

• Reconstitute/dilution: no reconstitution or dilution needed for BayRho-D (HyperRHO SD); Rhophylac, MICRhoGAM, RhoGAM, or liquid formulation of WinRho SDF

• WinRho SDF powder for IV use: if giving IV, reconstitute 600 international units or 1500 international units immediately before use with 2.5 ml of sterile diluent; reconstitute 5000 international units with 8.5 ml sterile diluent; add diluent to vial slowly down wall of vial; gently swirl until powder dissolved; do not shake

• WinRho SDF powder for IM use: IV giving IM, reconstitute 600 international units or 1500 international units immediately before use with 1.25 ml of sterile diluent; 5000 international units with 8.5 ml of sterile diluent; add diluent to vial slowly down wall of vial; gently swirl until powder dissolved; do not shake

IM route

• Use aseptic technique, observe for 20 min after administration

• Bring Rhophylac to room temp before use

• Inject into deltoid muscle of upper arm or anterolateral portion of upper thigh; do not inject into gluteal muscle

• If dose calculated requires multiple vials or syringes, use different sites at same time

IV route

• Use aseptic technique

• WinRho SDF: remove entire contents of vial to obtain calculated dose; if partial vial required for dosage calculation, withdraw entire vial contents to ensure correct calculation; infuse correct calculated dose over 3-5 min; do not infuse with other fluids, products

• Rhophylac: bring to room temp; infuse by slow IV; observe for 20 min

SIDE EFFECTS

CNS: Lethargy
CV: Hypo/hypertension
INTEG: Irritation at inj site, fever
MISC: Infection, ARDs, anaphylaxis, pulmonary edema, DIC
MS: Myalgia, arthralgia

INTERACTIONS

Decrease: antibody response—live virus vaccines (measles, mumps, rubella)

NURSING CONSIDERATIONS

Assess:
⚠ Allergies, reactions to immunizations; previous immunization with product
⚠ **Intravascular hemolysis:** back pain, chills, hemoglobinuria, renal insufficiency; usually when WinRho SDF is given in those with immune thrombocytopenia purpura
• Type, crossmatch mother and newborn's cord blood; if mother $Rh_o(D)$-negative, D^u-negative and newborn $Rh_o(D)$-positive, product should be given
Perform/provide:
• Storage in refrigerator
Evaluate:
• $Rh_o(D)$ sensitivity in transfusion error, prevention of erythroblastosis fetalis for normal vision
Teach patient/family:
• How product works; that product must be given after subsequent deliveries if subsequent babies are Rh-positive
⚠ To report immediately: shaking, fever, chills, dark urine, swelling of hands or feet, back pain, SOB (intravascular hemolysis)

riboflavin (vit B_2) (OTC)

(rye'boh-flay-vin)
Func. class.: Vit B_2, water soluble

ACTION: Needed for respiratory reactions by catalyzing proteins

USES: Vit B_2 deficiency or polyneuritis; cheilosis adjunct with thiamine
Unlabeled uses: Migraine prophylaxis

DOSAGE AND ROUTES

Deficiency
• **Adult: PO** 5-30 mg/day
• **Child ≥12 yr: PO** 3-10 mg/day then 0.6 mg/1000 calories ingested
RDA
• **Adult: PO** (males) 1.3 mg, (females) 1.1 mg
Migraine prophylaxis (unlabeled)
• **Adult: PO** 400 mg/day × 3 mo
Available forms: Tabs 5, 10, 25, 50, 100, 250 mg
Administer:
• With food for better absorption

SIDE EFFECTS

GU: Yellow discoloration of urine
Precautions: Pregnancy (A)

PHARMACOKINETICS

Half-life 65-85 min, 60% protein bound, unused amounts excreted in urine (unchanged)

INTERACTIONS

Increase: riboflavin need—alcohol, probenecid, tricyclics, phenothiazines
Decrease: action of tetracyclines
Drug/Lab Test
• May cause false elevations of urinary catecholamines

NURSING CONSIDERATIONS

Assess:
• Nutritional status: liver, eggs, dairy products, yeast, whole grains, green vegetables
Perform/provide:
• Storage in airtight, light-resistant container
Evaluate:
• Therapeutic response: absence of headache, GI problems, cheilosis, skin lesions, depression; burning, itchy eyes; anemia
Teach patient/family:
• That urine may turn bright yellow
• About the addition of needed foods rich in riboflavin
• To avoid alcohol

R

rifabutin (Rx)

(riff'a-byoo-ten)

Mycobutin

Func. class.: Antimycobacterial agent

Chem. class.: Rifamycin S derivative

Do not confuse:
rifabutin/rifampin/rifapentine

ACTION: Inhibits DNA-dependent RNA polymerase in susceptible strains of *Escherichia coli* and *Bacillus subtilis;* mechanism of action against *Mycobacterium avium* unknown

USES: Prevention of *M. avium* complex (MAC) in patients with advanced HIV infection

Unlabeled uses: *Helicobacter pylori* that has not responded to other treatment

CONTRAINDICATIONS: Hypersensitivity, active TB, WBC $<1000/mm^3$ or platelet count $<50,000/mm^3$

Precautions: Pregnancy (B), breastfeeding, children, hepatic disease, blood dyscrasias

DOSAGE AND ROUTES

• **Adult: PO** 300 mg/day (may take as 150 mg bid); max 600 mg/day

Renal dose

• **Adult: PO** CCr <30 ml/min, reduce by 50%

Available forms: Caps 150 mg

Administer:

• With food if GI upset occurs; better to take on empty stomach 1 hr before or 2 hr after meals; high-fat foods slow absorption; may take in 2 divided doses, may open capsule, mix with applesauce if unable to swallow whole cap

• Antiemetic if vomiting occurs

• After C&S completed; monthly to detect resistance

SIDE EFFECTS

CNS: *Headache,* fatigue, anxiety, confusion, insomnia

GI: *Nausea, vomiting, anorexia, diarrhea,* heartburn, hepatitis, discolored saliva, pseudomembranous colitis

GU: *Discolored urine*

HEMA: Hemolytic anemia, eosinophilia, thrombocytopenia, leukopenia

INTEG: *Rash*

MISC: Flulike symptoms, shortness of breath, chest pressure

MS: Asthenia, arthralgia, myalgia

PHARMACOKINETICS

53% absorbed, peak 2-3 hr, duration >24 hr, half-life 45 hr, metabolized in liver (active/inactive metabolites), excreted in urine primarily as metabolites

INTERACTIONS

Increase: levels of rifabutin: ritonavir

Decrease: action of amprenavir, anticoagulants, β-blockers, barbiturates, busPIRone, clofibrate, corticosteroids, cycloSPORINE, dapsone, delavirdine, disopyramide, doxycycline, efavirenz, estrogens, fluconazole, indinavir, ketoconazole, losartan, nelfinavir, nevirapine, oral contraceptives, phenytoin, quiNIDine, saquinavir, sulfonylureas, theophylline, tricyclic antidepressants, zidovudine, zolpidem

Drug/Food

• High-fat diet decreases absorption

Drug/Lab Test

Interference: folate level, vit B_{12}, BSP, gallbladder studies

NURSING CONSIDERATIONS

Assess:

⚠ **Acute TB:** chest x-ray, sputum culture, blood culture, biopsy of lymph nodes, PPD; product should not be given for active TB

• CBC for neutropenia, thrombocytopenia, eosinophilia

⚠ **Pseudomembranous colitis:** diarrhea, abdominal pain/cramping, fever, bloody stools

- Signs of anemia: Hct, Hgb, fatigue
- Hepatic studies weekly: ALT, AST, bilirubin
- Renal status before, each mo: BUN, creatinine, output, specific gravity, urinalysis
- Hepatic status: decreased appetite, jaundice, dark urine, fatigue

Evaluate:

- Therapeutic response: not used for active TB because of risk for development of resistance to rifampin; culture negative

Teach patient/family:

⚠ That patients using oral contraceptives should consider using nonhormonal methods of birth control, may decrease effect; to notify prescriber if pregnancy planned, suspected

- That compliance with dosage schedule, duration necessary
- That scheduled appointments must be kept because relapse may occur
- That urine, feces, saliva, sputum, sweat, tears may be colored red-orange; soft contact lenses may be permanently stained

⚠ To report flulike symptoms: excessive fatigue, anorexia, vomiting, sore throat; unusual bleeding, yellowish discoloration of skin, eyes; myositis: muscle or bone pain; diarrhea, fever, abdominal cramping, bloody stools

rifampin (Rx)

(rif'am-pin)

Rifadin, Rofact ✤

Func. class.: Antitubercular

Chem. class.: Rifamycin B derivative

Do not confuse:

rifampin/rifabutin

ACTION: Inhibits DNA-dependent polymerase, decreases tubercle bacilli replication

USES: Pulmonary TB, meningococcal carriers (prevention)

Unlabeled uses: Endocarditis, *Haemophilus influenzae type B prophylaxis,* Hansen's disease, *Mycobacterium avium* complex (MAC), orthopedic-device–related infection, pruritus

CONTRAINDICATIONS: Hypersensitivity to this product, rifamycins; active *Neisseria meningitidis* infection

Precautions: Pregnancy (C), breast-feeding, children <5 yr, hepatic disease, blood dyscrasias

DOSAGE AND ROUTES

Tuberculosis

- **Adult: PO/IV** Max 600 mg/day as single dose 1 hr before meals or 2 hr after meals or 10 mg/kg/day 2-3×/wk
- **Child >5 yr: PO/IV** 10-20 mg/kg/day as single dose 1 hr before meals or 2 hr after meals, max 600 mg/day with other antituberculars
- **6-mo regimen:** 2 mo treatment of isoniazid, rifampin, pyrazinamide, and possibly streptomycin or ethambutol then rifampin and isoniazid 3 4 mo
- **9-mo regimen:** rifampin and isoniazid supplemented with pyrazinamide, streptomycin, or ethambutol

Meningococcal carriers

- **Adult: PO/IV** 600 mg bid × 2 days, max 600 mg/dose
- **Child >5 yr: PO/IV** 10-20 mg/kg × 2 days, max 600 mg/dose
- **Infant 3 mo-1 yr:** 5 mg/kg **PO** bid × 2 days

Prevention of *H. influenzae* type B infection (unlabeled)

- **Adult: PO** 600 mg/day × 4 days
- **Child: PO** 20 mg/kg/day × 4 days

MAC (unlabeled)

- **Adult: PO/IV** 600 mg/day used with ≥3 other active microbials
- **Child: PO/IV** 10-20 mg/kg/day used with ≥3 other active microbials

Endocarditis with prosthetic valves (unlabeled)

- **Adult: PO** 300 mg q8hr with gentamicin and vancomycin

R

• **Child: PO** 20 mg/kg/day in 2 divided doses with gentamicin and vancomycin, max 900 mg/day

Available forms: Caps 150, 300 mg; powder for inj 600 mg/vial

Administer:

• After C&S completed; monthly to detect resistance

• Do not give IM, SUBCUT

PO route

• On empty stomach, 1 hr before or 2 hr after meals with full glass of water, give with other products for TB

• Antiemetic if vomiting occurs

• Capsules may be opened, mixed with applesauce or jelly

Intermittent IV INF route

• After diluting each 600 mg/10 ml of sterile water for inj (60 mg/ml), swirl, withdraw dose and dilute in 100 ml or 500 ml of D_5W given as inf over 3 hr; if diluted in 100 ml, give over ½ hr; do not admix with other sol or products

Y-site compatibilities: amiodarone, bumetanide, midazolam, pantoprazole, vancomycin

SIDE EFFECTS

CNS: Headache, fatigue, anxiety, drowsiness, confusion

EENT: Visual disturbances

GI: *Nausea, vomiting, anorexia, diarrhea,* pseudomembranous colitis, *heartburn,* sore mouth and tongue, pancreatitis, increased LFTs

GU: Hematuria, acute renal failure, hemoglobinuria

HEMA: Hemolytic anemia, eosinophilia, thrombocytopenia, leukopenia

INTEG: Rash, pruritus, urticaria

MISC: Flulike symptoms, menstrual disturbances, edema, SOB, Stevens-Johnson syndrome, toxic epidermal necrolysis, angioedema, anaphylaxis

MS: Ataxia, weakness

PHARMACOKINETICS

PO: Peak 1-4 hr, duration >24 hr, half-life 3 hr, metabolized in liver (active/inactive metabolites), excreted in urine as free product (30% crosses placenta) and in breast milk

INTERACTIONS

⚠ Do not use with protease inhibitors

Increase: hepatotoxicity—isoniazid

Decrease: action of acetaminophen, alcohol, anticoagulants, antidiabetics, β-blockers, barbiturates, benzodiazepines, chloramphenicol, clofibrate, corticosteroids, cycloSPORINE, dapsone, digoxin, doxycycline, haloperidol, hormones, imidazole antifungals, NIFEdipine, oral contraceptives, phenytoin, protease inhibitors, theophylline, verapamil, zidovudine

Increase: LFTs

Decrease: Hgb

Drug/Lab Test

Interference: folate level, vit B_{12}

NURSING CONSIDERATIONS

Assess:

• **Infection:** sputum culture, lung sounds, characteristics of sputum

• Signs of anemia: Hct, Hgb, fatigue

• Hepatic function monthly: ALT, AST, bilirubin, decreased appetite, jaundice, dark urine, fatigue

• Renal status before, each mo: BUN, creatinine, output, specific gravity, urinalysis

⚠ **Serious skin reactions:** fever, sore throat, fatigue, ulcers; lesions in mouth, lips, rash; can be fatal

⚠ **Pseudomembranous colitis:** diarrhea, fever, abdominal pain/cramping, bloody stools, product should be discontinued, prescriber notified

Evaluate:

• Therapeutic response: decreased symptoms of TB, culture negative

Teach patient/family:

• That compliance with dosage schedule, duration necessary

• That scheduled appointments must be kept because relapse may occur

• To avoid alcohol because hepatotoxicity may occur

• That urine, feces, saliva, sputum, sweat, tears may be colored red-orange;

that soft contact lenses may be permanently stained

⚠ To report flulike symptoms: excessive fatigue, anorexia, vomiting, sore throat; unusual bleeding; yellowish discoloration of skin, eyes; diarrhea with pus, mucous, blood

• To use nonhormonal form of birth control; to notify prescriber if pregnancy planned, suspected; not to breastfeed

rifapentine (Rx)

(riff'ah-pen-teen)

Priftin

Func. class.: Antitubercular

Chem. class.: Rifamycin derivative

ACTION: Inhibits DNA-dependent polymerase, decreases tubercle bacilli replication

USES: Pulmonary TB; must be used with at least one other antitubercular agent

CONTRAINDICATIONS: Hypersensitivity to rifamycins, porphyria

Precautions: Pregnancy (C), breastfeeding, children <12 yr, geriatric patients, hepatic disease, blood dyscrasias, HIV

DOSAGE AND ROUTES

Intensive phase

• **Adult: PO** 600 mg (four 150-mg tabs) 2×/wk with an interval of 72 hr between doses × 2 mo; must be given with at least 1 other antitubercular agent

Continuation phase

• **Adult: PO** 600 mg q wk × 4 mo in combination with isoniazid or other appropriate antitubercular product

Available forms: Tabs 150 mg

Administer:

• May give with food for GI upset, use other products for TB

• Antiemetic if vomiting occurs

• After C&S completed; monthly to detect resistance

SIDE EFFECTS

CNS: Headache, fatigue, anxiety, dizziness

EENT: Visual disturbances

GI: *Nausea, vomiting, anorexia, diarrhea,* bilirubinemia, hepatitis, increased ALT, AST, *heartburn,* pancreatitis, pseudomembranous colitis

GU: Hematuria, pyuria, proteinuria, urinary casts, urine discoloration

HEMA: Thrombocytopenia, leukopenia, neutropenia, lymphopenia, anemia, leukocytosis, purpura, hematoma

INTEG: Rash, pruritus, urticaria, acne

MISC: Increased B/P

MS: Gout, arthrosis

PHARMACOKINETICS

Peak 5-6 hr; half-life 13 hr; metabolized in liver (active/inactive metabolites); excreted in urine, feces, breast milk; protein binding 97%; steady state 10 days; CYP450 3A4, 2C8/9 inducer

INTERACTIONS

⚠ Do not use with protease inhibitors

Decrease: action of amitriptyline, anticoagulants, antidiabetics, barbiturates, β-blockers, chloramphenicol, clarithromycin, clofibrate, corticosteroids, cycloSPORINE, dapsone, delavirdine, diazepam, digoxin, diltiazem, disopyramide, doxycycline, fentaNYL, fluconazole, haloperidol, indinavir, itraconazole, ketoconazole, methadone, mexiletine, nelfinavir, NIFEdipine, nortriptyline, oral contraceptives, phenothiazines, phenytoin, progestins, quiNIDine, quiNINE, ritonavir, saquinavir, sildenafil, tacrolimus, theophylline, thyroid preparations, tocainide, verapamil, warfarin, zidovudine

Drug/Food

Increase: absorption with food

Drug/Lab Test

Increase: LFTs, platelets

Decrease: Hgb, WBC

Interference: folate level, vit B_{12}

R

• **Child: PO** 20 mg/kg/day in 2 divided doses with gentamicin and vancomycin, max 900 mg/day

Available forms: Caps 150, 300 mg; powder for inj 600 mg/vial

Administer:

• After C&S completed; monthly to detect resistance

• Do not give IM, SUBCUT

PO route

• On empty stomach, 1 hr before or 2 hr after meals with full glass of water, give with other products for TB

• Antiemetic if vomiting occurs

• Capsules may be opened, mixed with applesauce or jelly

Intermittent IV INF route

• After diluting each 600 mg/10 ml of sterile water for inj (60 mg/ml), swirl, withdraw dose and dilute in 100 ml or 500 ml of D_5W given as inf over 3 hr; if diluted in 100 ml, give over $^1/_2$ hr; do not admix with other sol or products

Y-site compatibilities: amiodarone, bumetanide, midazolam, pantoprazole, vancomycin

SIDE EFFECTS

CNS: Headache, fatigue, anxiety, drowsiness, confusion

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MISC: Flulike symptoms, menstrual disturbances, edema, SOB, Stevens-Johnson syndrome, toxic epidermal necrolysis, angioedema, anaphylaxis

MS: Ataxia, weakness

PHARMACOKINETICS

PO: Peak 1-4 hr, duration >24 hr, half-life 3 hr, metabolized in liver (active/inactive metabolites), excreted in urine as free product (30% crosses placenta) and in breast milk

INTERACTIONS

⚠ Do not use with protease inhibitors

Increase: hepatotoxicity—isoniazid

Decrease: action of acetaminophen, alcohol, anticoagulants, antidiabetics, β-blockers, barbiturates, benzodiazepines, chloramphenicol, clofibrate, corticosteroids, cycloSPORINE, dapsone, digoxin, doxycycline, haloperidol, hormones, imidazole antifungals, NIFEdipine, oral contraceptives, phenytoin, protease inhibitors, theophylline, verapamil, zidovudine

Increase: LFTs

Decrease: Hgb

Drug/Lab Test

Interference: folate level, vit B_{12}

NURSING CONSIDERATIONS

Assess:

• **Infection:** sputum culture, lung sounds, characteristics of sputum

• Signs of anemia: Hct, Hgb, fatigue

• Hepatic function monthly: ALT, AST, bilirubin, decreased appetite, jaundice, dark urine, fatigue

• Renal status before, each mo: BUN, creatinine, output, specific gravity, urinalysis

⚠ Serious skin reactions: fever, sore throat, fatigue, ulcers; lesions in mouth, lips, rash; can be fatal

⚠ Pseudomembranous colitis: diarrhea, fever, abdominal pain/cramping, bloody stools, product should be discontinued, prescriber notified

Evaluate:

• Therapeutic response: decreased symptoms of TB, culture negative

Teach patient/family:

• That compliance with dosage schedule, duration necessary

• That scheduled appointments must be kept because relapse may occur

• To avoid alcohol because hepatotoxicity may occur

• That urine, feces, saliva, sputum, sweat, tears may be colored red-orange;

that soft contact lenses may be permanently stained

⚠ To report flulike symptoms: excessive fatigue, anorexia, vomiting, sore throat; unusual bleeding; yellowish discoloration of skin, eyes; diarrhea with pus, mucous, blood

• To use nonhormonal form of birth control; to notify prescriber if pregnancy planned, suspected; not to breastfeed

rifapentine (Rx)

(riff'ah-pen-teen)

Priftin

Func. class.: Antitubercular

Chem. class.: Rifamycin derivative

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USES: Pulmonary TB; must be used with at least one other antitubercular agent

CONTRAINDICATIONS: Hypersensitivity to rifamycins, porphyria

Precautions: Pregnancy (C), breastfeeding, children <12 yr, geriatric patients, hepatic disease, blood dyscrasias, HIV

DOSAGE AND ROUTES

Intensive phase

• **Adult: PO** 600 mg (four 150-mg tabs) 2×/wk with an interval of 72 hr between doses × 2 mo; must be given with at least 1 other antitubercular agent

Continuation phase

• **Adult: PO** 600 mg q wk × 4 mo in combination with isoniazid or other appropriate antitubercular product

Available forms: Tabs 150 mg

Administer:

• May give with food for GI upset, use other products for TB

• Antiemetic if vomiting occurs

• After C&S completed; monthly to detect resistance

SIDE EFFECTS

CNS: Headache, fatigue, anxiety, dizziness

EENT: Visual disturbances

GI: *Nausea, vomiting, anorexia, diarrhea,* bilirubinemia, hepatitis, increased ALT, AST, *heartburn,* pancreatitis, pseudomembranous colitis

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PHARMACOKINETICS

Peak 5-6 hr; half-life 13 hr; metabolized in liver (active/inactive metabolites); excreted in urine, feces, breast milk; protein binding 97%; steady state 10 days; CYP450 3A4, 2C8/9 inducer

INTERACTIONS

⚠ Do not use with protease inhibitors

Decrease: action of amitriptyline, anticoagulants, antidiabetics, barbiturates, β-blockers, chloramphenicol, clarithromycin, clofibrate, corticosteroids, cycloSPORINE, dapsone, delavirdine, diazepam, digoxin, diltiazem, disopyramide, doxycycline, fentaNYL, fluconazole, haloperidol, indinavir, itraconazole, ketoconazole, methadone, mexiletine, nelfinavir, NIFEdipine, nortriptyline, oral contraceptives, phenothiazines, phenytoin, progestins, quiNIDine, quiNINE, ritonavir, saquinavir, sildenafil, tacrolimus, theophylline, thyroid preparations, tocainide, verapamil, warfarin, zidovudine

Drug/Food

Increase: absorption with food

Drug/Lab Test

Increase: LFTs, platelets

Decrease: Hgb, WBC

Interference: folate level, vit B_{12}

NURSING CONSIDERATIONS

Assess:

- Baselines of CBC, AST, ALT, bilirubin, platelets
- **Infection:** sputum culture, lung sounds
- Signs of anemia: Hct, Hgb, fatigue
- Hepatic studies monthly: ALT, AST, bilirubin; decreased appetite, jaundice, dark urine, fatigue
- Renal status monthly: BUN, creatinine, output, specific gravity, urinalysis

⚠ **Pseudomembranous colitis:** diarrhea, fever, abdominal pain/cramping, bloody diarrhea; discontinue if present, notify prescriber

Evaluate:

- Therapeutic response: decreased symptoms of TB, culture negative

Teach patient/family:

- That compliance with dosage schedule, duration necessary
- That scheduled appointments must be kept because relapse may occur
- That urine, feces, saliva, sputum, sweat, tears may be colored red-orange; that soft contact lenses, dentures may be permanently stained

⚠ To use alternative method of contraception; that oral contraceptive action may be decreased; to notify prescriber if pregnancy planned, suspected; to avoid breastfeeding

⚠ To report flulike symptoms: excessive fatigue, anorexia, vomiting, sore throat; unusual bleeding, yellowish discoloration of skin, eyes; diarrhea with pus, mucous, blood

rifaximin (Rx)

(rif-ax'i-min)

Xifaxan

Func. class.: Antiinfective—miscellaneous

Chem. class.: Analog of rifampin

Do not confuse:

rifaximin/rifampin

ACTION: Binds to bacterial-DNA–dependent RNA polymerase, thereby inhibiting bacterial RNA synthesis

USES: Traveler's diarrhea in those ≥12 yr caused by *E. coli*, hepatic encephalopathy

Unlabeled uses: Crohn's disease, diverticulitis

CONTRAINDICATIONS: Hypersensitivity to product, rifamycins; diarrhea with fever, blood in stool

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients

DOSAGE AND ROUTES

Traveler's diarrhea

- **Adult and child ≥12 yr: PO** 200 mg tid × 3 days without regard to meals

Hepatic encephalopathy

- **Adult: PO** 550 mg bid

Crohn's disease (unlabeled)

- **Adult: PO** 200 mg tid × 16 wk

Diverticulitis (unlabeled)

- **Adult: PO** 400 mg bid with mesalamine 800 mg tid × 7 days then 7 days/mo

Irritable bowel syndrome (unlabeled)

- **Adult: PO** 550 mg tid × 14 day

Available forms: Tabs 200, 550 mg

Administer:

- Without regard to food

SIDE EFFECTS

CNS: Abnormal dreams, dizziness, insomnia

CV: Hypotension, chest pain, peripheral edema

GI: *Abdominal pain, constipation, defecation urgency, flatulence, nausea, rectal tenesmus,* vomiting, ascites, pseudomembranous colitis

MISC: *Headache, pyrexia,* motion sickness, tinnitus, rash, photosensitivity, exfoliative dermatitis

MS: Arthralgia

RESP: Dyspnea, cough, pharyngitis

PHARMACOKINETICS

Half-life 1.8-4.5 hr, excreted in feces, peak 1-4 hr

NURSING CONSIDERATIONS

Assess:

• GI symptoms: amount, character of diarrhea; abdominal pain, nausea, vomiting, blood in stool, do not use in those with blood in stool, increased temperature with diarrhea

⚠ Overgrowth of infection, pseudomembranous colitis

Evaluate:

• Therapeutic response: absence of infection

Teach patient/family:

⚠ To discontinue rifaximin, notify prescriber if diarrhea persists >24-48 hr, if diarrhea worsens, or if blood in stools and fever present

• To avoid hazardous activities if dizziness occurs

• To notify prescriber if pregnancy planned, suspected

• That headache, rash, insomnia, abnormal dreams, tinnitus may occur

• To take without regard to food

• To take as directed, consume all of the product prescribed

rilpivirine

Edurant

Func. class.: Antiretroviral

Chem. class.: Nonnucleoside transcriptase inhibitors (NNTIs)

ACTION: Inhibits HIV-1 reverse transcriptase; unlike nucleoside reverse transcriptase inhibitors (NRTIs), it does not compete for binding nor does it require phosphorylation to be active. Binds directly to a site on reverse transcriptase causing disruption of the enzyme's active site thereby blocking RNA-dependent and DNA-dependent DNA polymerase activities

USES: HIV in combination with other antiretrovirals

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (B), breastfeeding, neonates, infants, children, adolescents <18 yr, immune reconstitution syndrome, antimicrobial resistance, pancreatitis, coinfection hepatitis B or C and HIV, hepatic disease, depression, suicidal ideation, QT prolongation, torsades de pointes, hyperlipidemia, hypertriglyceridemia, hypercholesterolemia, immune reconstitution syndrome

DOSAGE AND ROUTES

Antiretroviral treatment–naive adults (HIV) with other antiretroviral agents

• **Adults:** PO 25 mg/day with a meal

Available forms: Tab 25 mg

Administer:

• Give in combination with other antiretroviral agents; in antiretroviral treatment–naive adults, rilpivirine is utilized as an alternative to efavirenz in NNRTI-based treatment regimens; potential rilpivirine-based treatment regimens combine rilpivirine with either tenofovir plus emtricitabine or lamiVUDine; or abacavir plus emtricitabine or lamiVUDine; or zidovudine plus emtricitabine or lamiVUDine

• Give with a meal

SIDE EFFECTS

CNS: Depressed mood, dysphoria, major depression, mood alteration, negative thoughts, suicide attempts, fatigue, headache, dizziness, drowsiness

GI: Nausea, vomiting, abdominal pain, diarrhea, cholecystitis, cholelithiasis, decreased appetite, elevated hepatic enzymes, hyperbilirubinemia, hypercholesterolemia

GU: Glomerulonephritis membranous/glomerulonephritis mesangioproliferative

PHARMACOKINETICS:

Protein binding (99.7%) to albumin; metabolism via oxidation CYP3A; terminal elimination half-life 50 hr, excretion feces (85%), 25% excreted unchanged; urine (6.1%); peak 4-5 hr; increased effect 40% (food), decreased effect 50% (high protein drink)

INTERACTIONS:

Increase: rilpivirine effect—CYP3A4 inhibitors (delavirdine, efavirenz, darunavir, tipranavir, atazanavir, fosamprenavir, indinavir, nelfinavir, aldesleukin IL-2, amiodarone aprepitant, basiliximab, boceprevir, bromocriptine, chloramphenicol, clarithromycin, conivaptan danazol, dalfopristin, dasatinib, diltiazem, dronedarone, erythromycin, ethinyl estradiol, fluconazole, FLUoxetine, fluvoxaMINE, fosaprepitant, imatinib, isoniazid, itraconazole, ketoconazole, lanreotide, lapatinib, miconazole, nefazodone, niCARdipine, octreotide, posaconazole, quiNINE, ranolazine, rifaximin, tamoxifen, telaprevir, telithromycin, troleandomycin, verapamil, voriconazole, zafirlukast)

Increase: QT prolongation—class IA/III antidysrhythmics, some phenothiazines, β-agonists, local anesthetics, tricyclics, chloroquine, droperidol, haloperidol, pentamidine; CYP3A4 inhibitors (amiodarone, clarithromycin, erythromycin, telithromycin, troleandomycin, arsenic trioxide, levomethadyl); CYP3A4 substrates (methadone, pimozide, QUEtiapine, quiNIDine, risperiDONE, ziprasidone, lopinavir, saquinavir, fluconazole, posaconazole, dasatinib, dronedarone, lapatinib, octreotide, ranolazine, citalopram, abarelix, alfuzosin, amoxapine, apomorphine, artemether, lumefantrine, asenapine, ofloxacin, ciprofloxacin, cloZAPine, cyclobenzaprine, dolasetron, eribulin, flecainide, gatifloxacin, gemifloxacin, halogenated anesthetics, iloperidone, levofloxacin, maprotiline, mefloquine, moxifloxacin, nilotinib, norfloxacin, OLANZapine, ondansetron, paliperidone, palonosetron, QUEtiapine)

Increase: rilpivirine adverse reactions, fungal infections—fluconazole, voriconazole

Decrease: rilpivirine effect, treatment failure—CYP3A4 inducers (phenytoin, fosphenytoin, barbiturates, OXcarbazepine, carBAMazepine, rifabutin, rifampin, rifapentine, dexamethasone), efavirenz, nevirapine, ritonavir; aminoglutethimide, bexarotene, bosentan, griseofulvin, metyrapone, modafinil, flutamide, nafcillin, pioglitazone, primidone, topiramate); proton pump inhibitors (PPIs)

Decrease: rilpivirine effect, treatment failure—H2 receptor antagonists (cimetidine, famotidine, nizatidine, ranitidine), give 12 hr before or 4 hr after rilpivirine

Decrease: rilpivirine effect—antacids, use >2 hrs before, or 4 hr after rilpivirine

Drug/Food

Increase: adverse reactions—grapefruit juice

NURSING CONSIDERATIONS

Assess:

- **HIV:** Assess symptoms of HIV including opportunistic infections before and during treatment, some may be life-threatening; monitor plasma HIV RNA, CD4+, CD8 + cell counts, serum β-2 microglobulin, serum ICD+24 antigen levels; treatment failures occur more frequently in those with baseline HIV-1 RNA concentrations >100,000 copies/ml than in patients with concentrations <100,000 copies/ml; monitor serum cholesterol, lipid panel
- Antiretroviral drug resistance testing is recommended before initiation of therapy in antiretroviral treatment–naive patients
- For adults and adolescents, initiation of antiretroviral therapy is recommended in any patient with a history of an AIDS-defining infection; with a CD4 ≤500/mm^3; who is pregnant; who has HIV-associated nephropathy; or who is being treated for hepatitis B (HBV) infection

Suicidal thoughts/behaviors: Assess frequently for suicidal ideation, report any increase in depressive symptoms

• Hepatic disease: monitor for elevated hepatic enzymes (>2.5 × ULN); grade 3 and 4 may be higher in patients co-infected with hepatitis B or C

Perform/Provide:

• Storage at room temperature away from heat and moisture

Teach Patient/family:

• That product is not a cure but controls symptoms

• That product must be taken in combination with other prescribed products

riluzole (Rx)

(rill'you-zole)

Rilutek

Func. class.: ALS agent

Chem. class.: Benzathiazole

ACTION: May act by modulating the release of glutamate and inactivating voltage-dependent sodium channels

USES: Amyotropic lateral sclerosis (ALS)

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (C), breast-feeding, children, geriatric patients, neutropenia, renal/hepatic disease, cigarette smoking, febrile illness, pneumonia

DOSAGE AND ROUTES

• **Adult: PO** 50 mg q12hr, take 1 hr before or 2 hr after meals

Available forms: Tabs 50 mg

Administer:

• 1 hr before or 2 hr after meals; high-fat meal decreases absorption

SIDE EFFECTS

CNS: Hypertonia, depression, dizziness, insomnia, somnolence, vertigo, paresthesia

CV: Hypertension, tachycardia, phlebitis, palpitation, postural hypertension

GI: Nausea, vomiting, dyspepsia, anorexia, diarrhea, flatulence, stomatitis, dry mouth, increased LFTs, jaundice, abdominal pain

GU: UTI, dysuria

HEMA: Neutropenia

INTEG: Pruritus, eczema, alopecia, exfoliative dermatitis

MS: Arthralgia

RESP: Decreased lung function, rhinitis, increased cough, pneumonia

PHARMACOKINETICS

Well absorbed; extensively metabolized by liver; excretion in urine, feces

INTERACTIONS

Increase: elimination of riluzole—cigarette smoking, rifampin, omeprazole, charcoal-broiled food

Increase: hepatic injury—allopurinol, methyldopa, sulfaSALAzine, leflunomide, methotrexate, tacrine

Increase: LFTs—barbiturates, carBAMazepine

Decrease: elimination of riluzole—caffeine, theophylline, amitriptyline, quinolones

Drug/Food

Decrease: absorption—high-fat meal

NURSING CONSIDERATIONS

Assess:

• Clinical improvement of neurologic function

• Hepatic studies: AST, ALT, bilirubin, GGT at baseline, monthly × 3 mo, then q3mo; monitor LFTs

• Neutropenia <500/mm

Evaluate:

• Therapeutic response: improvement in neurologic status

Teach patient/family:

• To report febrile illness, signs of infection, cardiac/respiratory changes, which may indicate neutropenia

• About the reason for the product, expected results

rimantadine (Rx)

(ri-man'tah-deen)

Flumadine

Func. class.: Synthetic antiviral

Chem. class.: Tricyclic amine

Do not confuse:
rimantadine/amantadine/ranitidine

ACTION: Prevents uncoating of nucleic acid in viral cell, thereby preventing the penetration of the virus to the host; causes the release of dopamine from neurons

USES: Prophylaxis or treatment of influenza type A

CONTRAINDICATIONS: Hypersensitivity to this product, amantadine
Precautions: Pregnancy (C), breastfeeding, children <1 yr, seizure disorders, renal/hepatic disease

DOSAGE AND ROUTES

Influenza type A

Prophylaxis
- **Adult and child >10 yr: PO** 100 mg bid
- **Child 1-10 yr: PO** 5 mg/kg/day, max 150 mg

Treatment
- **Adult: PO** 100 mg bid; start treatment at onset of symptoms, continue for ≥1 wk
- **Child ≥10 yr (unlabeled): PO** 200 mg/day either as single dose or in 2 divided doses
- **Child 1-9 yr (unlabeled): PO** 6.6 mg/kg/day in 2 divided doses, max 150 mg/day in 2 divided doses
- **Geriatric: PO** 100 mg/day

Renal/hepatic dose
- **Adult: PO** ≤10 ml/min, 100 mg daily

Available forms: Tabs 100 mg; syr 50 mg/5 ml

Administer:
- Give with full glass of water
- Within 48 hr of exposure to influenza; continue for 10 days after contact
- At least 4 hr before bedtime to prevent insomnia
- After meals for better absorption, to decrease GI symptoms
- In divided doses to prevent CNS disturbances: headache, dizziness, fatigue, drowsiness

SIDE EFFECTS

CNS: *Headache, dizziness,* fatigue, depression, hallucinations, tremors, seizures, insomnia, poor concentration, asthenia, gait abnormalities, *anxiety,* confusion
CV: Pallor, palpitations, edema
EENT: Tinnitus, taste abnormality, eye pain
GI: *Nausea, vomiting,* constipation, *dry mouth, anorexia, abdominal pain,* diarrhea, dyspepsia
INTEG: Rash

PHARMACOKINETICS

PO: Peak 6 hr, elimination half-life 13-65 hr, plasma protein binding (40%)

INTERACTIONS

Increase: rimantadine concentration—cimetidine
Decrease: peak concentration of rimantadine—acetaminophen, aspirin; intranasal influenza vaccine (separate by ≥48 hr)

NURSING CONSIDERATIONS

Assess:
- **Seizures;** if seizures occur, product should be discontinued
- Bowel pattern before, during treatment
- CNS effects in geriatric patients, patients with severe renal/hepatic disease
- Skin eruptions, photosensitivity after administration of product
- Respiratory status: rate, character, wheezing, tightness in chest
- Signs of infection

Perform/provide:
- Storage in tight, dry container

Evaluate:
• Therapeutic response: absence of fever, malaise, cough, dyspnea with infection
Teach patient/family:
• About aspects of product therapy: the need to report dyspnea, dizziness, poor concentration, behavioral changes
• To avoid hazardous activities if dizziness occurs

rimexolone ophthalmic

See Appendix B

risedronate (Rx)

(rih-sed'roh-nate)
Actonel, Atelvia
Func. class.: Bone resorption inhibitor
Chem. class.: Bisphosphonate

Do not confuse:
Actonel/Actos

ACTION: Inhibits bone resorption, absorbs calcium phosphate crystal in bone, and may directly block dissolution of hydroxyapatite crystals of bone

USES: Paget's disease; prevention, treatment of osteoporosis in postmenopausal women; glucocorticoid-induced osteoporosis; osteoporosis in men
Unlabeled uses: Osteolytic metastases

CONTRAINDICATIONS: Hypersensitivity to bisphosphonates, inability to stand or sit upright for ≥30 min, esophageal stricture, achalasia, hypocalcemia
Precautions: Pregnancy (C), breastfeeding, children, renal disease, active upper GI disorders, dental disease, hyperparathyroidism, infection, vit D deficiency, coagulopathy, chemotherapy, asthma

DOSAGE AND ROUTES

Paget's disease
• **Adult: PO** 30 mg/day × 2 mo; patients with Paget's disease should receive calcium and vit D if dietary intake lacking; if relapse occurs, retreatment advised
Treatment/prevention of postmenopausal osteoporosis
• **Adult: PO** 5 mg/day or 35 mg/wk or 75 mg/day × 2 consecutive days 2× monthly or 150 mg/mo
Glucocorticoid osteoporosis
• **Adult: PO** 5 mg/day
Osteoporosis in men
• **Adult: PO** 35 mg/wk
Osteolytic metastases (unlabeled)
• **Adult: PO** 30 mg/day × 6 mo
Renal dose
• **Adult: PO** CCr <30 ml/min, avoid use
Available forms: Tabs 5, 30, 35, 150 mg; tab, gastro-resistant, weekly 35 mg; tab, weekly 35 mg
Administer:
• For 2 months to be effective for Paget's disease
• With a full glass of water; patient should be in upright position for ½ hr; swallow whole; do not crush, break, chew
• Supplemental calcium and vit D for Paget's disease if instructed by prescriber
• Give daily ≥30 min before meals or give weekly

SIDE EFFECTS

CNS: Dizziness, headache, depression
CV: *Chest pain,* hypertension, atrial fibrillation
GI: *Abdominal pain, diarrhea, nausea,* constipation, esophagitis
MISC: Rash, UTI, pharyngitis, hypocalcemia, hypophosphatemia, increase PTH
MS: Osteonecrosis of the jaw, severe muscle/joint/bone pain, fractures
SYST: Angioedema

PHARMACOKINETICS

Rapidly cleared from circulation, taken up mainly by bones (50%), eliminated primarily through kidneys, absorption

R

decreased by food, terminal half-life 220 hr

INTERACTIONS

Increase: GI irritation—NSAIDs, salicylates
Decrease: absorption of risedronate—aluminum, calcium, iron, magnesium salts, antacids
Drug/Food
Decrease: bioavailability—take ½ hr before food or drinks other than water
Drug/Lab Test
Decrease: calcium

NURSING CONSIDERATIONS

Assess:
- **Paget's disease:** headache, bone pain, increased head circumference
- **Osteoporosis:** in men or postmenopausal women; bone density study before and periodically during treatment
- Phosphate, alk phos, calcium; creatinine, BUN (renal disease)
- **Hypocalcemia:** paresthesia, twitching, laryngospasm, Chvostek's/Trousseau's signs

⚠ **Serious skin reactions:** angioedema
- **Dental health:** assess dental health, provide antiinfectives for dental extraction; cover with antiinfectives before dental extraction

⚠ For atrial fibrillation

Perform/provide:
- Storage in cool environment, out of direct sunlight

Evaluate:
- Therapeutic response: increased bone mass, absence of fractures

Teach patient/family:
- To sit upright for ½ hr after dose to prevent irritation
- To comply with diet, vitamin/mineral supplements
- To notify prescriber if pregnancy is suspected or if breastfeeding
- To maintain good oral hygiene
- To notify all health care providers of use
- That musculoskeletal pain may occur within a few days/mo after starting but usually resolves; use acetaminophen
- To exercise regularly; to avoid alcohol, tobacco

risperiDONE (Rx)

(ris-pehr'ih-dohn)
RisperDAL, RisperDAL Consta, RisperDAL M-TAB
Func. class.: Antipsychotic
Chem. class.: Benzisoxazole derivative

Do not confuse:
RisperDAL/reserpine

ACTION: Unknown; may be mediated through both dopamine type 2 (D_2) and serotonin type 2 ($5\text{-}HT_2$) antagonism

USES: Irritability associated with autism, bipolar disorder, mania, schizophrenia
Unlabeled uses: Acute psychosis, agitation, ADHD, dementia, psychotic depression, Tourette's syndrome

CONTRAINDICATIONS: Hypersensitivity, breastfeeding
Precautions: Pregnancy (C), children, geriatric patients, cardiac/renal/hepatic disease, breast cancer, Parkinson's disease, CNS depression, brain tumor, dehydration, diabetes, hematologic disease, seizure disorders, abrupt discontinuation

Black Box Warning: Increased mortality in elderly patients with dementia-related psychosis

DOSAGE AND ROUTES

- **Adult: PO** 2 mg/day as single dose or in 2 divided doses, adjust dose at intervals of ≥24 hr and 1-2 mg/day as tolerated to 4-8 mg/day; **IM** establish dosing with **PO** before **IM** 25 mg q2wk, may increase to max 50 mg q2wk
- **Adolescent: PO** 0.5 mg/day in AM or PM, adjust dose at intervals of ≥24 hr

and 0.5-1 mg/day as tolerated to 3 mg/day
• **Geriatric: PO** 0.5 mg daily-bid, increase by 1 mg/wk; **IM** 25 mg q2wk
Hepatic/renal dose
• **Adult: PO** 0.5 mg bid, increase by 0.5 mg bid, increase to 1.5 mg bid at intervals ≥1 wk
Available forms: Tabs 0.25, 0.5, 1, 2, 3, 4 mg; oral sol 1 mg/ml; orally disintegrating tabs 0.5, 1, 2, 3, 4 mg; long-acting inj kit (Risperdal Consta) 12.5, 25, 37.5, 50 mg
Administer:
• Reduced dose in geriatric patients
• Anticholinergic agent on order from prescriber, to be used for EPS
• Avoid use with CNS depressants
• Conventional tabs: give without regard to meals
• **Oral disintegrating tab** (Risperdal M-TAB): do not open blister pack until ready to use; tear 1 of the 4 units apart at perforation; bend corner where indicated; peel back foil; do not push tab through foil; remove from pack and place product on patient's tongue; tab disintegrates in seconds and can be swallowed with/without liquids, do not split or chew
• **Oral sol:** May dilute 3-4 oz of beverage, measure dose using calibrated pipette; not compatible with coffee, tea
IM route
Preparation
• Only suspend in the diluent provided and with the supplied needle; do not substitute any components of the dose pack including the SmartSite Needle-Free Vial Access Device or Needle-Pro device
• Before admixing, remove the dose pack from the refrigerator and allow to come to room temperature for about 30 min before reconstituting
• Remove the plastic colored cap from the vial without removing the gray rubber stopper; wipe top of the gray stopper with an alcohol wipe and allow to dry
• Peel back the blister pouch and remove the Vial Access Device by holding between the white Luer cap and the skirt; do not touch the spike tip at any time
• Place the vial on a hard surface and hold the base; orient the Vial Access Device vertically over the vial so that the spike tip is at the center of the vial's rubber stopper
• With a straight downward push, press the spike tip of the Vial Access Device through the center of the vial's rubber stopper until the device securely snaps onto the vial top; improper placement of the Vial Access Device on the vial could result in leakage of the diluent upon transfer
• Hold the base of the vial and swab the syringe connection point (blue circle) of the Vial Access Device with an alcohol wipe and allow to dry before attaching the syringe
• During syringe assembly steps, avoid over-tightening or syringe component parts might loosen from the syringe body
• To open the syringe, hold syringe only by the white collar and snap off the smooth white cap; do not twist or cut off the white cap; remove white cap together with the rubber tip cap inside
• While holding the white collar of the syringe, insert and press the syringe tip into the blue circle of the Vial Access Device and twist in a clockwise motion to secure the connection of the syringe to the Vial Access Device; hold the skirt of the Vial Access Device during attachment to prevent it from spinning; keep the syringe and the Vial Access Device aligned
• Inject the entire contents of the syringe containing the diluent into the vial
• Holding the plunger down with the thumb, shake the vial vigorously for a minimum of 10 sec; suspension should appear uniform, thick, and milky colored, and all the powder is dispersed in liquid; the microspheres will be visible in liquid, but no dry microspheres remain
• Invert completely and slowly withdraw the contents of the suspension from the vial into the syringe; tear the section of the vial label at the perforation and apply the detached label to the syringe

• While holding the white collar of the syringe, unscrew the syringe from the Vial Access Device, then discard both the vial and the Vial Access Device appropriately
• Select the appropriate color-coded needle provided with the kit; two distinct needles are provided: The needle with the yellow hub and print is for injection into the gluteal muscle (2-inch needle) and the needle with the green hub and print is for deltoid muscles (1-inch needle); they are not interchangeable; do not use the needle intended for gluteal injection for deltoid injection, and vice versa
• Peel the blister pouch of the Needle-Pro safety device open halfway; grasp the transparent needle sheath using the plastic peel pouch; to prevent contamination, do not touch the orange Needle-Pro safety device's Luer connector; while holding the white collar of the syringe, attach the Luer connection of the orange Needle-Pro safety device to the syringe with an easy clockwise twisting motion
• While holding the white collar of the syringe, grasp the transparent needle sheath and seat the needle firmly on the orange Needle-Pro safety device with a push and a clockwise twist; seating the needle will secure the connection between the needle and the orange Needle-Pro safety device
• While holding the white collar of the syringe, pull the transparent needle sheath straight away from the needle; do not twist the sheath because this can loosen the luer connection
• Resuspension is necessary before administration, because settling occurs after reconstitution; resuspend the microspheres in the syringe by shaking vigorously
• Refer to the Instructions for Use section of the product labeling for detailed visual aids that accompany the written instructions

Administration

• Only for IM; do not give IV
• Resuspension is necessary before administration, because settling occurs after reconstitution; resuspend the microspheres in the syringe by shaking vigorously
• Remove any air bubbles by tapping the syringe and slowly depressing the plunger with the needle in an upright position
• Inject the entire contents of the syringe into the upper outer quadrant of the gluteal area or the deltoid muscle; inject immediately after reconstitution to avoid settling; gluteal injections should be alternated between the two buttocks
• After the injection is complete, press the needle into the orange Needle-Pro safety device by gently pressing the orange Needle-Pro safety device against a flat surface with one hand; as the orange Needle-Pro safety device is pressed, the needle firmly engages into the orange Needle-Pro safety device
• Visually confirm full engagement of the needle into the Needle-Pro safety device, then appropriately discard both the used and unused needle provided in the dose pack
• Do not store the vial after reconstitution or the suspension will settle
• Do not combine 2 different dosage strengths of RisperDAL Consta in a single administration
• The dose pack device is for single use only; do not reprocess for subsequent reuse because the integrity of the device may be compromised, leading to a deterioration in performance

Stability after reconstitution

• Once in suspension, the product may remain at room temperature, but it must be used within 6 hr; always resuspend before administration if not used immediately

SIDE EFFECTS

CNS: *EPS, pseudoparkinsonism, akathisia, dystonia, tardive dyskinesia; drowsiness, insomnia, agitation, anxiety, headache,* seizures, neuroleptic malignant syndrome, dizziness, suicidal ideation, head titubation (shaking)

CV: Orthostatic hypotension, tachycardia; heart failure, sudden death (geriatric patients), AV block
EENT: Blurred vision, tinnitus
GI: *Nausea,* vomiting, *anorexia, constipation,* jaundice, weight gain
GU: Hyperprolactinemia, gynecomastia, dysuria
HEMA: Neutropenia, granulocytopenia
MISC: Renal artery occlusion; hyperprolactinemia (child)
MS: Rhabdomyolysis
RESP: Rhinitis; sinusitis, upper respiratory infection, cough

PHARMACOKINETICS

PO: Extensively metabolized by liver to major active metabolite, plasma protein binding 90%, peak 1-2 hr, excreted 90% in urine, terminal half-life 3-24 hr

INTERACTIONS

⚠ Increase: possible death in dementia-related psychosis: furosemide
Increase: sedation—other CNS depressants, alcohol
⚠ Increase: serotonin syndrome, neuroleptic malignant syndrome—CYP2D6 inhibitors (SSRIs, SNRIs)
Increase: EPS—other antipsychotics
Increase: risperiDONE excretion—carBAMazepine
⚠ Increase: QT prolongation—class IA/III antidysrhythmics, some phenothiazines, β-agonists, local anesthetics, tricyclics, haloperidol, methadone, chloroquine, clarithromycin, droperidol, erythromycin, pentamidine
Increase: risperiDONE levels: acetylcholinesterase, inhibitors, CYP2D6 inhibitors, SSRIs, valproic acid, verapamil
Decrease: risperiDONE action—CYP2D6 inducers (carBAMazepine, barbiturates, phenytoins, rifampin)
Decrease: levodopa effect—levodopa
Drug/Herb
Decrease: risperiDONE effect—echinacea
Drug/Lab Test
Increase: prolactin levels, blood, glucose, lipids

NURSING CONSIDERATIONS

Assess:
⚠ Suicidal thoughts/behaviors: often when depression is lessened; mental status before initial administration
• Bilirubin, CBC, hepatic studies monthly
• Affect, orientation, LOC, reflexes, gait, coordination, sleep pattern disturbances
⚠ QT prolongation: B/P standing, lying; pulse, respirations; take these q4hr during initial treatment; establish baseline before starting treatment; report drops of 30 mm Hg; watch for ECG changes
• Dizziness, faintness, palpitations, tachycardia on rising
• **EPS:** akathisia, tardive dyskinesia (bizarre movements of the jaw, mouth, tongue, extremities), pseudoparkinsonism (rigidity, tremors, pill rolling, shuffling gait)
⚠ Serious reactions in geriatric patient: fatal pneumonia, heart failure, sudden death, dementia
⚠ Neuroleptic malignant syndrome: hyperthermia, increased CPK, altered mental status, muscle rigidity, seizures, change in B/P, fatigue, tachycardia
• Constipation, urinary retention daily; if these occur, increase bulk, water in diet
• Weight gain, hyperglycemia, metabolic changes in diabetes, increased lipids
Perform/provide:
• Decreased stimuli by dimming lights, avoiding loud noises
• Supervised ambulation until patient stabilized on medication; do not involve patient in strenuous exercise program because fainting is possible; patient should not stand still for a long time
• Increased fluids to prevent constipation
• Storage in tight, light-resistant container (PO); unopened vials in refrigerator, protect from light; do not freeze
Evaluate:
• Therapeutic response: decrease in emotional excitement, hallucinations, de-

R

lusions, paranoia; reorganization of patterns of thought, speech

Teach patient/family:

- That orthostatic hypotension may occur; to rise from sitting or lying position gradually
- To avoid abrupt withdrawal of product because EPS may result; product should be withdrawn slowly
- To avoid OTC preparations (cough, hay fever, cold) unless approved by prescriber; that serious product interactions may occur; to avoid use of alcohol because increased drowsiness may occur
- To avoid hazardous activities if drowsy or dizzy
- To comply with product regimen
- To report impaired vision, tremors, muscle twitching
- That heat stroke may occur in hot weather; to take extra precautions to stay cool; to avoid hot tubs, hot showers, tub baths
- To use contraception; to inform prescriber if pregnancy is planned or suspected, do not breastfeed
- To notify provider of suicidal thoughts/behaviors

TREATMENT OF OVERDOSE:

Lavage if orally ingested; provide airway; *do not induce vomiting*

ritonavir (Rx)

(ri-toe'na-veer)

Norvir

Func. class.: Antiretroviral

Chem. class.: Protease inhibitor

Do not confuse:

ritonavir/Retrovir

ACTION:

Inhibits human immunodeficiency virus (HIV-1) protease and prevents maturation of the infectious virus

USES:

HIV-1 in combination with at least 2 other antiretrovirals

CONTRAINDICATIONS:

Hypersensitivity

Black Box Warning: Coadministration with other drugs

Precautions: Pregnancy (B), breastfeeding, hepatic disease, pancreatitis, diabetes, hemophilia, AV block, hypercholesterolemia, immune reconstitution syndrome, neonates, cardiomyopathy, immune reconstitution syndrome, infants 1-6 mo (overdose)

DOSAGE AND ROUTES

- **Adult and adolescent >16 yr: PO** 600 mg bid; if nausea occurs, begin at ½ dose and gradually increase, max 1200 mg/day
- **Adolescent ≤16 yr and child, infant: PO** 400 mg/m² bid up to 1200 mg/day, may start lower and escalate

Available forms: Caps 100 mg; oral sol 80 mg/ml; tab 100 mg

Administer:

Tablet/capsule

- Take with food, swallow whole; do not crush, break, chew
- When switching from cap to tab, more GI symptoms may occur, will lessen over time
- Use dosage titration to minimize side effects
- **Oral sol:** shake well, use calibrated measuring device
- Mix liquid formulation with chocolate milk or liquid nutritional supplement to improve taste
- **Overdose:** infants, children, alcohol 43.2% alcohol, 26.57% propylene glycol oral sol, calculate total amount of alcohol, propylene glycol from all products given

SIDE EFFECTS

CNS: *Paresthesia, headache,* seizures, fever, dizziness, insomnia, asthenia, intracranial bleeding

CV: QT, PR interval prolongation

GI: *Diarrhea,* buccal mucosa ulceration, *abdominal pain, nausea, taste perversion,* dry mouth, *vomiting, anorexia*

INTEG: Rash

MISC: Asthenia, angioedema, anaphylaxis, Stevens-Johnson syndrome, increase lipids, lipodystrophy, toxic epidermal necrolysis
MS: Pain, rhabdomyolysis, myalgia

PHARMACOKINETICS

Well absorbed, 98% protein binding, hepatic metabolism, peak 2-4 hr, terminal half-life 3-5 hr

INTERACTIONS

Black Box Warning: Increase: toxicity—amiodarone, astemizole, azole antifungals, benzodiazepines, buPROPion, ClSapride, cloZAPine, desipramine, dihydroergotamine, encainide, ergotamine, flecainide, HMG-CoA reductase inhibitors, interleukins, meperidine, midazolam, pimozide, piroxicam, propafenone, propoxyphene, quiNIDine, ranolazine, saquinavir, terfenadine, triazolam, zolpidem; CYP2D6 inhibitors

Black Box Warning: Increase: QT prolongation—class 1A/III antidysrhythmics, some phenothiazines, β-agonists, local anesthetics, tricyclics, haloperidol, chloroquine, droperidol, pentamidine, CYP3A4 inhibitors (amiodarone, clarithromycin, dasatinib, erythromycin, telithromycin, troleandomycin), arsenic trioxide, levomethadyl, CYP3A4 substrates (methadone, pimozide, QUEtiapine, quiNIDine, risperiDONE, ziprasidone)

Increase: ritonavir levels—fluconazole
Increase: level of both products—clarithromycin, ddI
Increase: levels of—bosentan
Decrease: ritonavir levels—rifamycins, nevirapine, barbiturates, phenytoin
Decrease: levels of anticoagulants, atovaquone, divalproex, ethinyl estradiol, lamotrigine, phenytoin, sulfamethoxazole, theophylline, voriconazole, zidovudine

Drug/Herb

Decrease: ritonavir levels—St. John's wort; avoid concurrent use
- Avoid use with red yeast rice

Drug/Lab Test

Increase: AST, ALT, K, CK, cholesterol, GGT, triglycerides, uric acid
Decrease: Hct, Hgb, RBC, neutrophils, WBC

NURSING CONSIDERATIONS

Assess:

- **HIV:** viral load, CD4 at baseline, throughout therapy; blood glucose, plasma HIV RNA, serum cholesterol/lipid profile; resistance testing before starting therapy and after treatment failure
- **Immune reconstitution syndrome:** may occur with combination therapy, may develop inflammatory response with opportunistic infection (MAC, Graves' disease, Guillain-Barré Syndrome, TB, PCP), may occur during initial treatment or months after
- Signs of infection, anemia
- Hepatic studies: ALT, AST, in those with hepatic disease, monitor q3mo
- Bowel pattern before, during treatment; if severe abdominal pain with bleeding occurs, discontinue product; monitor hydration
- Skin eruptions; rash
- ⚠ **Rhabdomyolysis:** muscle pain, increased CPK, weakness, swelling of affected muscles; if these occur and if confirmed by CPK, product should be discontinued
- ⚠ **QT prolongation:** ECG for QT prolongation, ejection fraction; assess for chest pain, palpitations, dyspnea
- ⚠ **Serious skin disorders:** Stevens-Johnson syndrome, angioedema, anaphylaxis, toxic epidermal necrolysis

Perform/provide:

- Store caps in refrigerator

Evaluate:

- Therapeutic response: improvement in HIV symptoms; improving viral load, CD4+ T cells

Teach patient/family:

- To take as prescribed; if dose is missed, to take as soon as remembered up to 1 hr before next dose; not to double dose

R

- That product not a cure for HIV; that opportunistic infections may continue to be acquired
- That redistribution of body fat or accumulation of body fat may occur
- That others may continue to contract HIV from patient
- To avoid OTC, prescription medications, herbs, supplements unless approved by prescriber; not to use St. John's wort because it decreases product's effect
- That regular follow-up exams and blood work will be required

riTUXimab (Rx)

(rih-tuks'ih-mab)

Rituxan

Func. class.: Antineoplastic—miscellaneous; DMARDs

Chem. class.: Murine/human monoclonal antibody

ACTION: Directed against the CD20 antigen that is found on malignant B lymphocytes; CD20 regulates a portion of cell-cycle initiation/differentiation

USES: Non-Hodgkin's lymphoma (CD20 positive, B-cell), bulky disease (tumors >10 cm), rheumatoid arthritis, Wegener's granulomatosis, microscopic polyangitis

Unlabeled uses: Acquired blood factor deficiency, acute lymphocytic leukemia (ALL), Burkitt's lymphoma, chronic lymphocytic leukemia (CLL), hemolytic anemia, human herpesvirus 8, mantle cell lymphoma (MCL), multicentric Castleman's disease, peripheral blood stem cell (PBSC) mobilization, refractory pemphigus vulgaris, relapsing/remitting MS, ITP with dexamethasone, steroid refractory chronic graft-versus-host disease

CONTRAINDICATIONS: Hypersensitivity, murine proteins

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, pulmonary/cardiac/renal conditions

Black Box Warning: Exfoliative dermatitis, infusion-related reactions, progressive multifocal leukoencephalopathy

DOSAGE AND ROUTES

Relapsed or refractory low-grade or follicular, CD20-positive, B-cell non-Hodgkin's lymphoma (NHL)

- **Adult: IV** 375 mg/m² every wk × 4 doses, may re-treat with 4 more doses of 375 mg/m²/wk

First-line treatment of follicular, CD20-positive, B-cell NHL in combination with chemotherapy

- **Adult: IV** 375 mg/m² on day 1 of each cycle for up to 8 cycles; may be given with cyclophosphamide IV 750 mg/m² on day 1, vinCRIStine IV 1.4 mg/m² (max 2 mg) on day 1, and predniSONE 40 mg/m²/day PO on days 1–5

Single-agent maintenance therapy in patients with follicular, CD20-positive, B-cell NHL (complete or partial response following first-line treatment with riTUXimab in combination with chemotherapy)

- **Adult: IV** 375 mg/m² IV every 8 wk × 12 doses as maintenance therapy starting 8 wk after the completion of induction chemotherapy with 8 doses of riTUXimab with 6–8 cycles of cyclophosphamide, vinCRIStine, and predniSONE 4–6 cycles of cyclophosphamide, DOXOrubicin, vinCRIStine, and predniSONE

Component of the Zevalin (ibritumomab tiuxetan) regimen

- **Adult: IV** As a required component of the ibritumomab regimen; riTUXimab 250 mg/m² given within 4 hr before administration of Yttrium-90 ibritumomab that may occur on day 7, 8, or 9

First-line treatment of diffuse large B-cell, CD20-positive NHL in combination with CHOP or other anthracycline-based chemotherapy regimen

- **Adult 18–59 yr: IV** 375 mg/m² on day 1 of each cycle for up to 8 infusions

Single-agent maintenance therapy in patients with low-grade, CD20-positive, B-cell NHL with nonprogressing disease (stable disease or better) following first-line treatment with cyclophosphamide, vinCRIStine, and predniSONE (CVP)

• **Adult: IV** 375 mg/m² q wk × 4 wk repeated every 6 mo × 2 yr (total of 16 doses) as maintenance therapy starting 4 wk after the completion of first-line chemotherapy with 6 to 8 cycles of cyclophosphamide, vinCRIStine, and predniSONE (CVP)

Available forms: Inj 10 mg/ml (100 mg/10 ml, 500 mg/50 ml)

Administer:

Rheumatoid arthritis:

• Give methylPREDNISolone 100 mg or similar product 30 min before inf to decrease reactions

Intermittent IV INF route

• Hold antihypertensives 12 hr before administration

• After diluting to final conc of 1-4 mg/ml; use 0.9% NaCl, D_5W, gently invert bag to mix; do not mix with other products, give 50 mg/hr initially, if no reaction increase rate by 50 mg/hr to max 400 mg/hr

Y-site compatibilities: Amcyclovir, amifostine, amikacin, aminophylline, ampicillin, ampicillin/sulbactam, aztreonam, bleomycin, bumetanide, buprenorphine, busulfan, butorphanol, calcium gluconate, CARBOplatin, carmustine, ceFAZolin, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, ceftAZidime, ceftizoxime, ceftRIAXone, cefuroxime, chlorproMAZINE, cimetidine, CISplatin, clindamycin, cyclophosphamide, cytarabine, DACTINomycin, DAUNOrubicin hydrochloride, dexamethasone, dexrazoxane, digoxin, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, DOXOrubicin liposome, doxycycline, droperidol, enalaprilat, etoposide phosphate, famotidine, fentaNYL, filgrastim, floxuridine, fluconazole, fludarabine, fluorouracil, ganciclovir, gemcitabine, gentamicin, granisetron, haloperidol, heparin, hydrocortisone, HYDROmorphone, IDArubicin, ifosfamide, imipenem/cilastatin, irinotecan, leucovorin, levorphanol, LORazepam, magnesium sulfate, mannitol, meperidine, mesna, methotrexate, methylPREDNISolone, metoclopramide, metroNIDAZOLE, mitoMYcin, mitoXANtrone, morphine, nalbuphine, netilmicin, PACLitaxel, pentamidine, piperacillin/tazobactam, plicamycin, potassium chloride, prochlorperazine, promethazine, ranitidine, sargramostim, streptozocin, teniposide, theophylline, thiotepa, ticarcillin/clavulanate, tobramycin, trimethoprim/sulfamethoxazole, trimethobenzamide, vinBLAStine, vincRIStine, vinorelbine, zidovudine

SIDE EFFECTS

CNS: Life-threatening brain infection (progressive multifocal leukoencephalopathy)

CV: Cardiac dysrhythmias, heart failure, hypertension, MI, supraventricular tachycardia, angina

GI: *Nausea, vomiting, anorexia,* GI obstruction/perforation

GU: Renal failure

HEMA: Leukopenia, neutropenia, thrombocytopenia, anemia

INTEG: *Irritation at site, rash,* fatal mucocutaneous infections (rare)

MISC: *Fever,* chills, asthenia, *headache,* angioedema, hypotension, myalgia, bronchospasm, ARDs

SYST: Toxic epidermal necrolysis, tumor lysis syndrome, Stevens-Johnson syndrome, exfoliative dermatitis

PHARMACOKINETICS

Half-life 60-174 hr, binds to CD20 sites or lymphoma cells

INTERACTIONS

Increase: hypotension—antihypertensives, separate by 12 hr

R

Increase: nephrotoxicity—CISplatin, avoid concurrent use; if used, monitor renal status
Increase: bleeding—anticoagulants
• Avoid with vaccines, toxoids

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Fatal inf reaction: hypoxia, pulmonary infiltrates, ARDS, MI, ventricular fibrillation, cardiogenic shock; most fatal reactions occur with 1st inf; potentially fatal

Black Box Warning: Severe mucocutaneous reactions: Stevens-Johnson syndrome, lichenoid dermatitis, toxic epidermal lysis; occur 1-13 wk after product given, discontinue treatment immediately

Black Box Warning: Tumor lysis syndrome: acute renal failure requiring hemodialysis, hyperkalemia, hypocalcemia, hyperuricemia, hyperphosphatemia; allopurinol and adequate hydration may be needed

Black Box Warning: Multifocal leukoencephalopathy: confusion, dizziness, lethargy, hemiparesis; monitor periodically

• CBC, differential, platelet count weekly; withhold product if WBC is $<3500/mm^3$ or platelet count $<100,000/mm^3$; notify prescriber of results; product should be discontinued
• ECG, serum creatinine/BUN, electrolytes, uric acid
• GI symptoms: frequency of stools, abdominal pain, perforation/obstruction may occur
• **Infection:** fever, increased temperature, flulike symptoms in those with Wegener's granulomatosis and microscopic polyangiitis in those using DMARDs

Perform/provide:

• Storage of vials at 36° F-40° F, protect vials from direct sunlight, inf sol is stable at 36° F-46° F × 24 hr and at room temp for another 12 hr

Evaluate:

• Therapeutic response: prevention of increasing cancer progression

Teach patient/family:

• To avoid use with vaccines, toxoids
• To use contraception during, for up to 12 mo after therapy
⚠ To report to prescriber possible infection (cough, fever, chills, sore throat), renal issues (painful urination, back/side pain), bleeding (gums, stools, urine, bruising, emesis, fatigue)
• To avoid OTC products
• To avoid crowds, those with known infections
• To maintain fluid intake

rivaroxaban

Xarelto
Func. class.: Anticoagulant
Chem. class.: Factor Xa inhibitor

ACTION: A novel, oral anticoagulant that selectively and potently inhibits coagulation factor Xa

USES: For deep venous thrombosis (DVT) prophylaxis/treatment, which may lead to pulmonary embolism (PE), in patients undergoing knee or hip replacement surgery; for stroke prophylaxis and systemic embolism prophylaxis in patients with nonvalvular atrial fibrillation

CONTRAINDICATIONS Severe hypersensitivity

Black Box Warning: Active bleeding

Precautions Pregnancy (category C), breastfeeding, neonates, infants, children, adolescents, geriatric patients, moderate or severe hepatic disease (Child-Pugh Class B or C), hepatic disease associated with coagulopathy, creatinine clearance <30 ml/min for use as DVT prophylaxis and <15 ml/min for stroke and systemic embolism prophylaxis in nonvalvular atrial fibrillation, dental procedures, aneurysm, diabetes

retinopathy, diverticulitis, endocarditis, GI bleeding, hypertension, obstetric delivery, peptic ulcer disease, stroke, surgery

Black Box Warning: Abrupt discontinuation, epidermal/spinal anesthesia

Patients, especially those with dental disease, should be instructed in proper oral hygiene, including caution in use of regular toothbrushes, dental floss, toothpicks

DOSAGE AND ROUTES

DVT prophylaxis, which may lead to pulmonary embolism (PE) (knee or hip replacement)

• **Adult: PO** 10 mg/day × 12 days after knee replacement surgery or × 35 days after hip replacement; administer the initial dose ≥6-10 hr after surgery once hemostasis has been established

DVT/PE treatment/reduction of risk

• **Adult: PO** 15 mg bid with food × 21 days then 20 mg q day for a total of 6 mo, may continue after 6 mo to reduce risk

Stroke prophylaxis and systemic embolism prophylaxis (with nonvalvular atrial fibrillation)

• Unless pathological bleeding occurs, do not discontinue rivaroxaban in the absence of alternative

• **Adult: PO** 20 mg/day with evening meal (CrCl >50 ml/min)

Converting from warfarin to rivaroxaban

• Discontinue warfarin and start rivaroxaban when INR is <3

Converting from another anticoagulant other than warfarin to rivaroxaban

• Start rivaroxaban 0-2 hr before the next scheduled evening administration of anticoagulant (omit that dose of anticoagulant); for continuous inf of unfractionated heparin, stop the inf and initiate rivaroxaban simultaneously

Converting from rivaroxaban to another anticoagulant with rapid onset (not warfarin)

• Discontinue rivaroxaban and give the first dose of the other anticoagulant (oral or parenteral) at the time that the next dose of rivaroxaban would have been administered

Available forms: Tabs 10, 20, 50 mg

Administer:

⚠ **For DVT prophylaxis:** give daily without regard to food, give initial dose ≥6-10 hr after surgery when hemostasis has been established

⚠ **For stroke/systemic embolism prophylaxis:** give daily with evening meal

• If dose is not given at correct time, give as soon as possible on the same day

SIDE EFFECTS

GI: Increased hepatic enzymes, hyperbilirubinemia, jaundice, nausea, cholestasis, cytolytic hepatitis

HEMA: Bleeding, intracranial bleeding, epidural hematoma, GI bleeding, retinal hemorrhage, adrenal bleeding, retroperitoneal hemorrhage, cerebral hemorrhage, subdural hematoma, epidural hematoma, hemiparesis, thrombocytopenia

INTEG: Pruritus, blister, hypersensitivity, anaphylactic reaction, anaphylactic shock

SYST: Stevens-Johnson syndrome

PHARMACOKINETICS

Bioavailability 80%-100%, protein binding (92%-95%) albumin, excreted in urine 66% (36% unchanged, 30% metabolites), 28% in feces (7% unchanged, 21% metabolites), unchanged drug excreted in urine (via active tubular secretion, glomerular filtration); terminal elimination half-life 5-9 hr, peak 2-4 hr; increased effect in hepatic/renal disease, Japanese patients, increased terminal half-life in geriatric patients

INTERACTIONS

Increase: rivaroxaban effect, possible bleeding—ketoconazole itraconazole, ritonavir, lopinavir/ritonavir; conivaptan, clarithromycin, erythromycin, salicylates, NSAIDs, other anticoagulants, thrombolytics, platelet inhibitors, niCARdipine

Decrease: rivaroxaban effect—carBAMazepine, phenytoin, rifampin

R

Increase: nephrotoxicity—CISplatin, avoid concurrent use; if used, monitor renal status
Increase: bleeding—anticoagulants
• Avoid with vaccines, toxoids

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• Unless pathological bleeding occurs, do not discontinue rivaroxaban in the absence of alternative

• **Adult: PO** 20 mg/day with evening meal (CrCl >50 ml/min)

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Decrease: rivaroxaban effect—carBAMazepine, phenytoin, rifampin

R

Increase: rivaroxaban effect in renal impairment—telithromycin, darunavir, mifepristone, nelfinavir, pantoprazole, posaconazole, saquinavir, tamoxifen, lapatinib, azithromycin, diltiazem, verapamil, quiNIDine, ranolazine, dronedarone, amiodarone, felodipine

Drug/Herb:

Decrease: rivaroxaban effect—St. John's wort

Drug/Food:

Increase: rivaroxaban effect in renal disease—grapefruit juice

Decrease: rivaroxaban effect—food

NURSING CONSIDERATIONS

Assess:

Black Box Warning: **Bleeding:** monitor for bleeding, including bleeding during dental procedures (easy bruising, blood in urine, stools, emesis, sputum, epistaxis); there is no specific antidote

Black Box Warning: **Abrupt discontinuation:** avoid abrupt discontinuation unless an alternative anticoagulant in those with atrial fibrillation; discontinuing puts patients at an increased risk of thrombotic events; if product must be discontinued for reasons other than pathological bleeding, consider administering another anticoagulant

- **Pregnancy/breastfeeding:** pregnancy category C; identify if pregnancy is suspected or planned; pregnancy related hemorrhage may occur and anticoagulation cannot be monitored with standard laboratory testing; breastfeeding should be discontinued before beginning use of this product

Black Box Warning: **Epidural/spinal anesthesia:** epidural or spinal hematomas that result in long-term or permanent paralysis may occur in patients who have received anticoagulants and are receiving neuraxial anesthesia or undergoing spinal puncture; epidural catheter should not be removed <18 hr after the last dose of rivaroxaban; do not administer the next rivaroxaban dose <6 hr after the catheter removal; delay rivaroxaban administration for 24 hr if traumatic puncture occurs; monitor for neuro changes

- **Hepatic/renal disease:** increase in effect of product in hepatic disease (Child-Pugh Class B or C), hepatic disease with coagulopathy; renal failure/severe renal impairment (creatinine clearance <30 ml/min in DVT prophylaxis and <15 ml/min for stroke or systemic embolism prophylaxis in nonvalvular atrial fibrillation); product should be discontinued in acute renal failure; reduce dose in those with atrial fibrillation and CrCl 15-50 ml/min; monitor renal function periodically (creatinine clearance, BUN)

Perform/provide:

- Storage at room temperature

Evaluate:

- Prevention of DVT, stroke and systemic embolism

Teach patient/family:

- To report if pregnancy is planned or suspected, not to breastfeed

Black Box Warning: To report bleeding (bruising, blood in urine, stools, sputum, emesis, heavy menstrual flow); use soft toothbrush, electric shaver

- To inform all health care providers of use

Black Box Warning: To avoid abrupt discontinuation without another blood thinner

rivastigmine (Rx)

(riv-as-tig'mine)

Exelon, Exelon Patch

Func. class.: Anti-Alzheimer agent

Chem. class.: Cholinesterase inhibitor

ACTION: Potent, selective inhibitor of brain acetylcholinesterase (AChE) and butyrylcholinesterase (BChE)

USES: Mild to moderate Alzheimer's dementia, mild to moderate Parkinson's disease dementia (PDD)

Unlabeled uses: Vascular dementia, dementia with Lewy bodies, Pick's disease

CONTRAINDICATIONS:

Hypersensitivity to this product, other carbamates

Precautions: Pregnancy (B), breastfeeding, children, respiratory/cardiac/renal/hepatic disease, seizure disorder, peptic ulcer, urinary obstruction, asthma, increased intracranial pressure, surgery, GI bleeding, jaundice

DOSAGE AND ROUTES

• **Adult: PO** 1.5 mg bid with food; after ≥4 wk, may increase to 3 mg bid; may increase to 4.5 mg bid and thereafter 6 mg bid, max 12 mg/day; **TRANSDERMAL** apply 4.6 mg/24 hr/day, after ≥4 wk may increase to 9.5 mg/24 hr/day

Available forms: Caps 1.5, 3, 4.5, 6 mg; sol 2 mg/ml; transdermal patch 4.6, 9.5, 13.3 mg/24 hr

Administer:

• Oral sol, caps are interchangeable

• With meals; take with morning and evening meal even though absorption may be decreased

• Discontinue treatment for several doses, restart at same or next lower dosage level if adverse reactions cause intolerance

• If treatment is interrupted for more than several days, treatment should be initiated with lowest daily dose and titrated as indicated previously

• **Oral sol:** measure dose with supplied syringe; may be given undiluted or diluted in a small amount of water, fruit juice, or soda; stir diluted sol well, entire amount should be swallowed; stable for 4 hr when mixed

Transdermal route

• Once a day to hairless, clean, dry skin, not in an area that clothing will rub; rotate sites daily, do not apply to same site more than once q14days; remove liner; apply firmly; may be used during bathing, swimming; avoid saunas, excess sunlight or external heat such as saunas; each 5 cm^2 patch contains 9 mg base, rate of 4.6 mg/24 hr, each 10 cm^2 patch 18 mg base, rate of 9.5 mg/24 hr

SIDE EFFECTS

CV: QT prolongation, AV block, cardiac arrest, angina, MI, palpitations

CNS: *Tremors, confusion, insomnia,* psychosis, hallucination, depression, dizziness, headache, anxiety, somnolence, fatigue, syncope, EPS, exacerbation of Parkinson's disease

GI: *Nausea, vomiting, anorexia, abdominal distress, flatulence,* diarrhea, constipation, dyspepsia, colitis, eructation, fecal incontinence, GI bleeding/obstruction, GERD, gastritis, pancreatitis

MISC: Urinary tract infection, asthenia, increased sweating, hypertension, flulike symptoms, weight change

PHARMACOKINETICS

Rapidly and completely absorbed; metabolized to decarbamylated metabolite; half-life 1.5 hr; excreted via kidneys (metabolites); clearance lowered in geriatric patients, hepatic disease and increased with nicotine use; 40% protein binding

INTERACTIONS

Increase: synergistic effect—cholinergic agonists, other cholinesterase inhibitors

Increase: metabolism—nicotine

Increase: GI effects—NSAIDs

Decrease: rivastigmine effect—anticholinergics, sedating H_1 blockers, tricyclics, phenothiazines

NURSING CONSIDERATIONS

Assess:

• Hepatic studies: AST, ALT, alk phos, LDH, bilirubin, CBC

• **Severe GI effects:** nausea, vomiting, anorexia, weight loss, diarrhea

• B/P, heart rate, respiration during initial treatment; hypo/hypertension should be reported

R

• **Cognitive/mental status:** affect, mood, behavioral changes, depression, insomnia; complete suicide assessment

Perform/provide:

• Assistance with ambulation during beginning therapy; dizziness may occur

Evaluate:

• Therapeutic response: improved mood/cognition

Teach patient/family:

• About the procedure for giving oral sol; use instruction sheet provided; how to apply transdermal product, to fold in half and throw away, not to get in eyes, to wash hands after application; not to use heating pad, sauna, tanning bed

• To notify prescriber of severe GI effects

• That product may cause dizziness, anorexia, weight loss

• That effect may take weeks or months

• To notify prescriber if pregnancy is planned or suspected

rizatriptan (Rx)

(rye-zah-trip'tan)

Maxalt, Maxalt-MLT

Func. class.: Migraine agent

Chem. class.: 5-HT_{1D} receptor agonist, abortive agent-triptan

ACTION: Binds selectively to the vascular 5-$HT_{1B/1D}$ receptor subtype; exerts antimigraine effect; causes vasoconstriction of the cranial arteries

USES: Acute treatment of migraine

CONTRAINDICATIONS: Angina pectoris, history of MI, documented silent ischemia, Prinzmetal's angina, ischemic heart disease, concurrent ergotamine-containing preparations, uncontrolled hypertension, hypersensitivity, basilar or hemiplegic migraine

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, postmenopausal women, men >40 yr, risk factors for CAD, hypercholesterolemia, obesity, diabetes, impaired renal/hepatic function

DOSAGE AND ROUTES

• **Adult: PO** 5-10 mg single dose, redosing separated by ≥2 hr, max 30 mg/24 hr; use 5 mg for patient receiving propranolol, max 15 mg/24 hr

Available forms: Tabs (Maxalt) 5, 10 mg; orally disintegrating tabs (Maxalt-MLT) 5, 10 mg

Administer:

• **Orally disintegrating tab:** do not open blister until use; peel blister open with dry hands; place tab on patient's tongue, where it will dissolve, and have patient swallow with saliva (contains phenylalanine)

SIDE EFFECTS

CNS: *Dizziness, drowsiness, headache, fatigue,* warm/cold sensations, flushing

CV: MI, ventricular fibrillation, ventricular tachycardia, coronary artery vasospasm, palpitations, hypertension, peripheral vascular ischemia, ECG changes

ENDO: Hot flashes, mild increase in growth hormone

GI: *Nausea,* dry mouth, diarrhea, abdominal pain, ischemic colitis

RESP: Chest tightness, pressure, dyspnea

PHARMACOKINETICS

Onset of pain relief 10 min-2 hr; peak 1-1½ hr; duration 14-16 hr; 14% plasma protein binding; metabolized in liver (metabolite); excreted in urine (82%), feces (12%); half-life 2-3 hr

INTERACTIONS

⚠ Weakness, hyperreflexia, incoordination: SSRIs

Increase: levels of sibutramine

Increase: rizatriptan action—cimetidine, oral contraceptives, MAOIs, nonselective MAOI (type A and B), isocarboxazide, pargyline, phenelzine, propranolol, tranylcypromine

Increase: vasospastic effects—ergot, ergot derivatives, other 5-HT receptor agonists

Drug/Herb

⚠ Serotonin syndrome: St. John's wort

NURSING CONSIDERATIONS

Assess:

- **Migraine symptoms:** visual disturbances, aura, intensity, nausea, vomiting, photophobia
- Stress level, activity, recreation, coping mechanisms
- Neurologic status: LOC, blurring vision, nausea, vomiting, tingling in extremities preceding headache
- **Ingestion of tyramine foods** (pickled products, beer, wine, aged cheese), food additives, preservatives, colorings, artificial sweeteners, chocolate, caffeine, which may precipitate these types of headaches
- Renal status: urine output

Perform/provide:

- Quiet, calm environment with decreased stimulation: noise, bright light, excessive talking

Evaluate:

- Therapeutic response: decrease in frequency, severity of headache

Teach patient/family:

- **About use of orally disintegrating tab:** instruct patient not to open blister until use, to peel blister open with dry hands, to place tab on tongue, where it will dissolve, and to swallow with saliva (contains phenylalanine)
- To report any side effects to prescriber
- To use alternative contraception while taking product if oral contraceptives are being used
- That product does not prevent or reduce number of migraines; if 1st dose does not relieve pain, do not use more, notify prescriber

roflumilast

Daliresp

Func. class.: Respiratory anti-inflammatory agent

Chem. class.: Phosphodiesterase-4 (PDE4) inhibitor

ACTION: Roflumilast (and the active metabolite roflumilast N-oxide) selectively inhibit phosphodiesterase-4 (PDE4); not a bronchodilator; inhibition of the PDE4 enzyme blocks the hydrolyses and inactivation of cyclic adenosine monophosphate (cAMP), resulting in intracellular cAMP accumulation; decreases inflammatory activity, PDE4 inhibition may affect migration and actions of pro-inflammatory cells (neutrophils, other leukocytes, T-lymphocytes, monocytes, macrophages, fibroblasts)

USES: For the prevention of COPD exacerbations in patients with severe COPD associated with chronic bronchitis and a history of exacerbations

CONTRAINDICATIONS: *Moderate to severe hepatic disease* (Child-Pugh B or C)

Precautions: Pregnancy (category C), breastfeeding, neonates, infants, children, adolescents, acute bronchospasm, anxiety, insomnia, depression, suicidal ideation or behavior

DOSAGE AND ROUTES

- **Adult: PO** 500 mcg/day

Available forms: Tabs 500 mcg

Administer:

PO route

- Give without regard to meals

SIDE EFFECTS

CNS: Insomnia, anxiety, depression, headache, dizziness, tremor, suicidal ideation

EENT: Rhinitis, sinusitis

GI: *Weight loss, diarrhea, nausea,* anorexia, abdominal pain, dyspepsia, gastritis, vomiting
GU: Urinary tract infection
MS: Back pain, muscle cramps/spasm
SYST: Infections, influenza

PHARMACOKINETICS

80% absolute bioavailability; protein binding 99% (roflumilast); 97% (N-oxide metabolite); low penetration across the blood–brain barrier; extensively metabolized (liver); metabolism by CYP3A4 and CYP1A2 produces (active metabolite N-oxide); half-life parent drug 17 hr, metabolite 30; steady state 4 days (parent drug), 6 days (metabolite); 70% excreted in urine; parent drug peak 1 hr (range, 0.5-2 hr), metabolite peak 8 hr (range, 4-13 hr); contraindicated in moderate to severe hepatic impairment; use with caution in patients with mild hepatic

INTERACTIONS

Increase: roflumilast effect—CYP3A4/CYP1A2 inhibitors (enoxacin, cimetidine, delavirdine, indinavir, isoniazid, itraconazole, dalfopristin, quinupristin, tipranavir)
Increase: roflumilast effect—oral contraceptives (gestodene and ethinyl estradiol)
Decrease: roflumilast effect—CYP3A4 inducers (rifampin, barbiturates, carBAMazepine, phenytoin, erythromycin, ketoconazole, fluvoxaMINE, alcohol, etravirine, ritonavir, bexarotene, rifabutin, OXcarbazepine, nevirapine, modafinil, metyrapone, PHENobarbital, bosentan, dexamethasone)
Altered effect of: fosamprenavir
Drug/Herb
Decrease: roflumilast effect—St. John's wort

NURSING CONSIDERATIONS

Assess:
• Lung sounds and respiratory function baseline and periodically thereafter

⚠ Behavioral changes including mood, depression, suicidal thoughts/behaviors
• Liver function tests baseline and periodically thereafter; if increases in liver function studies occur, product should be discontinued
• Weight; weight loss is common
Perform/provide:
• Storage at room temperature
Evaluate:
• Decreasing exacerbations in COPD
Teach patient/family:
• To take product as directed, not to skip or double doses, to take missed doses as soon as remembered unless almost time for next dose
• Not to use OTC or other products without prescriber approval; not to discontinue other respiratory products unless approved by prescriber
• Not to be used for acute bronchospasm but may be continued during acute asthma attacks
⚠ **Suicidal thoughts/behaviors:** To notify prescriber of worsening depression or suicidal thoughts/behaviors

romiPLOStim (Rx)

(roe-mi-ploe'stim)
Nplate
Func. class.: Hematopoietin
Chem. class.: Thrombopoietin receptor agonist

ACTION: Thrombopoietin-like fusion protein produced by DNA recombinant technology

USES: Chronic idiopathic thrombocytopenic purpura in patients who have had an insufficient response to corticosteroids, immunoglobulins, or splenectomy

CONTRAINDICATIONS: Hypersensitivity to this product or mannitol
Precautions: Pregnancy (C), breastfeeding, children, malignancies, bleeding, bone marrow suppression

DOSAGE AND ROUTES

Thrombocytopenia in chronic idiopathic thrombocytopenic purpura (ITP) with insufficient response to corticosteroids, immunoglobulins, splenectomy

• **Adult: SUBCUT** The initial dosage is 1 mcg/kg SC every wk (based on actual body weight); increase the weekly dosage by 1 mcg/kg until the patient achieves a platelet count ≥50,000/mm³; do not exceed a maximum weekly dosage of 10 mcg/kg; use the lowest dosage needed to achieve and maintain a platelet count ≥50,000/mm³; monitor CBC, including platelet counts, every wk until a stable platelet count is achieved with platelets ≥50,000/mm³ ≥4 wk without dosage adjustment; then monitor the CBC, including platelet counts, monthly; once a stable dosage is achieved, if the platelet count falls to <50,000/mm³, increase the dosage by 1 mcg/kg/wk; if the platelet count increases to >200,000/mm³ for 2 consecutive weeks, reduce the dosage by 1 mcg/kg; if the platelet count is >400,000/mm³, temporarily stop romiPLOStim and continue to monitor the platelet count every wk; once the platelets are <200,000/mm³, restart, but reduce the previous dosage by 1 mcg/kg/wk; romiPLOStim may be administered concomitantly with other medical ITP therapies; if platelet counts exceed 50,000/mm³, other medical ITP therapies may be reduced or discontinued; discontinue romiPLOStim if the platelet count does not increase to avoid important bleeding after 4 wk of therapy at max dosage of 10 mcg/kg

Available forms: Inj vials 250, 500 mcg

Administer:

SUBCUT route

• Use syringe with 0.01-ml graduations
• Discard any unused portion in vial; do not pool unused portions from vials
• Dilute 250 mcg/0.72 preservative-free sterile water for inj; 500 mcg/1.2 preservative-free sterile water for inj; final conc 500 mcg/ml
• Gently swirl until dissolved; do not shake
• Do not use if discolored or if particulate matter is present
• Inject into outer aspect of upper arm or abdomen except for 2 inches around navel or front aspect of middle thigh; do not use areas that are bruised, scratched, or scarred
• Rotate inj sites

SIDE EFFECTS

CNS: *Dizziness, insomnia, headache,* fatigue
GI: Abdominal pain, dyspepsia, diarrhea
HEMA: Thromboembolism, thrombosis, bleeding, myelofibrosis, erythromelalgia
MS: Myalgia
SYST: Secondary malignancy, antibody formation

PHARMACOKINETICS

Peak 7-50 hr, half-life 1-34 days

INTERACTIONS

• Possible bleeding risk: anticoagulants, NSAIDs, platelet inhibitors, thrombolytics, salicylates

NURSING CONSIDERATIONS

Assess:

• Blood studies: CBC during treatment weekly and for 2 wk after discontinuing
• **Bone marrow suppression:** If cytopenias occur, product should be discontinued, may use a bone marrow biopsy and staining for fibrosis
• **Thromboembolic disease:** Do not use to normalize patients, use only in those with thrombocytopenia in idiopathic thrombocytopenic purpura, maintain platelets ≥ 50,000/mm³

Perform/provide:

• Refrigerated storage of vials, do not freeze; protect from light; diluted sol is stable refrigerated or at room temp for 24 hr

Evaluate:

• Therapeutic response: increase in platelet counts, absence of bleeding

R

Teach patient/family:
- To report bleeding
- About the reason for product and expected results, to avoid hazardous activities that may cause bleeding
- To report a missed dose to prescriber due to increased risk of bleeding
- That lab tests will be done weekly and dose may be changed; if dose is not changed, lab will be checked monthly; after drug is discontinued, labs will be checked weekly × 2 wk
- To advise prescriber if spleen has been removed, bleeding or clotting problems
- To notify prescriber if pregnancy is planned or suspected, pregnancy category (C); if pregnancy occurs, call registry 1-877-675-2831

rOPINIRole (Rx)

(roh-pin'ih-role)

Requip, Requip XL

Func. class.: Antiparkinson agent

Chem. class.: DOPamine-receptor agonist, nonergot

Do not confuse:
rOPINIRole/risperiDONE

ACTION: Selective agonist for D_2 receptors (presynaptic/postsynaptic sites); binding at D_3 receptor contributes to antiparkinson effects

USES: Parkinson's disease, restless leg syndrome (RLS)

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (C), dysrhythmias, affective disorder, psychosis, cardiac/renal/hepatic disease

DOSAGE AND ROUTES

Parkinson's disease

- **Adult: PO (regular release)** Initially, 0.25 mg PO tid × 1 wk; gradually titrate at weekly intervals: **Week 2**, 0.5 mg tid; **Week 3**, 0.75 mg tid; **Week 4**, 1 mg tid; **After week 4**, may increase by 1.5 mg/day each week, max 9 mg/day total dosage, and then by 3 mg/day each week, max 24 mg/day
- **PO (ext rel)** Initially, 2 mg/day × 1–2 wk, may increase by mg/day at intervals ≥1 wk based upon response; max 24 mg/day; if significant interruption of therapy occurs, retitration may be necessary

Conversion from immediate-release to extended-release tablets

- **Adult: PO** Currently taking 0.75–2.25 mg/day imm rel: give 2 mg/day ext rel
- **PO** Currently taking 3–4.5 mg/day imm rel: give 4 mg/day ext rel
- **PO** Currently taking 6 mg/day imm rel: give 6 mg/day ext rel
- **PO** Currently taking 7.5–9 mg/day imm rel: give 8 mg/day ext rel
- **PO** Currently taking 12 mg/day imm rel: give 12 mg/day ext rel
- **PO** Currently taking 15–18 mg/day imm rel: give 16 mg/day ext rel
- **PO** Currently taking 21 mg/day imm rel: give 20 mg/day ext rel
- **PO** Currently taking 24 mg/day imm rel: give 24 mg/day ext rel

Restless legs syndrome

- **Adult: PO (reg rel)** Initially, 0.25 mg every day 1-3 hr before bedtime; days 3–7, may increase to 0.5 mg every day; at the beginning of wk 2 (day 8) the dosage may be increased to 1 mg every day × 1 wk; weeks 3–6, dosage may be titrated up by 0.5 mg each wk (from 1.5–3 mg over the 5-wk period) as needed to achieve desired effect; wk 7, may increase dosage to 4 mg/day; dosage is titrated based on clinical response; give all doses 1–3 hr before bedtime

Available forms: Tabs 0.25, 0.5, 1, 2, 3, 4, 5 mg; ext rel tab 2, 4, 8, 12 mg

Administer:
- Product until NPO before surgery
- Adjust dosage to patient response; taper when discontinuing
- With meals to reduce nausea
- *Extended release:* do not chew, crush, or divide

SIDE EFFECTS

CNS: *Agitation, insomnia,* psychosis, hallucination, dystonia, depression, dizziness, somnolence, sleep attacks, impulse control disorders
CV: *Orthostatic hypotension,* tachycardia, hypo/hypertension, syncope, palpitations
EENT: Blurred vision
GI: *Nausea, vomiting, anorexia, dry mouth,* constipation, dyspepsia, flatulence
GU: Impotence, urinary frequency
HEMA: Hemolytic anemia, leukopenia, agranulocytosis
INTEG: Rash, sweating
RESP: Pharyngitis, rhinitis, sinusitis, bronchitis, dyspnea

PHARMACOKINETICS

Peak 1-2 hr, half-life 6 hr, extensively metabolized by liver by P450 CYP1A2 enzyme system, protein binding 40%

INTERACTIONS

Increase: rOPINIRole effect—cimetidine, ciprofloxacin, diltiazem, enoxacin, erythromycin, fluvoxaMINE, mexiletine, norfloxacin, tacrine, digoxin, theophylline, L-dopa
Decrease: rOPINIRole effects—butyrophenones, metoclopramide, phenothiazines, thioxanthenes

NURSING CONSIDERATIONS

Assess:
• **Parkinsonism:** akinesia, tremors, staggering gait, muscle rigidity, drooling
• B/P, respirations during initial treatment; hypo/hypertension should be reported
⚠ **Sleep attacks:** drowsiness, falling asleep without warning even during hazardous activities
• Mental status: affect, mood, behavioral changes, depression; complete suicide assessment; worsening of symptoms in restless leg syndrome

Perform/provide:
• Testing for diabetes mellitus, acromegaly if patient receiving long-term therapy
Evaluate:
• Therapeutic response: improvement in movement disorder
Teach patient/family:
• To notify prescriber if pregnancy is planned or suspected, pregnancy category (C)
• To take with food to prevent nausea
• To report hallucinations, confusion (usually in geriatric patients)
• That therapeutic effects may take several weeks to a few months
• To change positions slowly to prevent orthostatic hypotension
• To use product exactly as prescribed; if product is discontinued abruptly, parkinsonian crisis may occur
• That drowsiness, sleep attacks may occur; to avoid driving, other hazardous activities until response known
• To avoid alcohol, CNS depressants cough and cold products
⚠ To notify prescriber if unusual urges occur

rosiglitazone (Rx)

(ros-ih-glit'ah-zone)
Avandia
Func. class.: Antidiabetic, oral
Chem. class.: Thiazolidinedione

R

ACTION: Improves insulin resistance by hepatic glucose metabolism, insulin receptor kinase activity, insulin receptor phosphorylation

USES: Type 2 diabetes mellitus, alone or in combination with sulfonylureas, metformin, insulin
Unlabeled uses: Increased ovulation frequency in those with polycystic ovary syndrome; reduced in-stent restenosis in those with diabetes

CONTRAINDICATIONS: Breastfeeding, children, hypersensitivity to thia-

zolidinediones, diabetic ketoacidosis, jaundice

Black Box Warning: NYHA III, IV acute heart failure, heart failure

Precautions: Pregnancy (C), geriatric patients, thyroid disease, renal/hepatic disease, heart failure, class I, II NYHA

Black Box Warning: MI

DOSAGE AND ROUTES

• **Adult: PO** 4 mg/day or in 2 divided doses, may increase to 8 mg/day or in 2 divided doses after 12 wk; may be added to metformin, sulfonylurea for adult dose

Available forms: Tabs 2, 4, 8 mg

Administer:

PO route

• Once or in 2 divided doses, without regard to food

• Tabs crushed and mixed with food or fluids for patients with difficulty swallowing

• Only through the REMS Program 1-800-Avandia

SIDE EFFECTS

CNS: Fatigue, *headache*

CV: MI, CHF, death (geriatric patients)

ENDO: Hypo/hyperglycemia

GI: Weight gain, hepatotoxicity, increase total, LDL, HDL cholesterol; decrease free fatty acids, diarrhea

MISC: Accidental injury, URI, sinusitis, anemia, back pain, diarrhea, edema, bone fractures (female)

SYST: Anaphylaxis, Stevens-Johnson syndrome, lactic acidosis

PHARMACOKINETICS

Maximal reductions in FBS after 6-12 wk; protein binding 99.8%; excreted in urine, feces; elimination half-life 3-4 hr; may be excreted in breast milk

INTERACTIONS

Increase: hypoglycemia—gemfibrozil, fluvoxaMINE, ketoconazole, trimethoprim; monitor glucose

• Avoid concurrent use with insulin, nitrates

• May increase or decrease level: CYP2C5 inducer/inhibitors

Drug/Herb

Increase: antidiabetic effect—garlic, horse chestnut

Drug/Lab Test

Increase: ALT, HDL, LDL, total cholesterol, blood glucose

Decrease: Hgb/Hct

NURSING CONSIDERATIONS

Assess:

Black Box Warning: CHF/MI: dyspnea, crackles, edema, weight gain ≥5 lb, jugular venous distention; may need to change dose or discontinue product, do not use in acute coronary syndrome, NYHA Class 3/IV heart failure

⚠ **Lactic acidosis:** dyspnea, abdominal pain, muscle pain; notify prescriber

• Hypoglycemic reactions (sweating, weakness, dizziness, anxiety, tremors, hunger), hyperglycemic reactions soon after meals

⚠ Systemic reactions: anaphylaxis, Stevens-Johnson syndrome, lactic acidosis

⚠ **Hepatotoxicity:** LFTs periodically AST, ALT (if ALT >2.5 × ULN, do not use product)

• Fasting blood sugar, A1c, plasma lipids/lipoproteins, B/P, body weight during treatment

• To use product provider/patient must be enrolled in the Avandia-Rosiglitazone Medicines Access Program

Perform/provide:

• Conversion from other oral hypoglycemic agents if needed; change may be made without gradual dosage change; monitor blood glucose during conversion

• Storage in tight container in cool environment

Evaluate:

• Therapeutic response: decrease in polyuria, polydipsia, polyphagia; clear sensorium; absence of dizziness; stable gait; blood glucose, A1c improvement

Teach patient/family:
- To monitor blood glucose; that periodic liver function tests mandatory; to report edema, weight gain
- About the symptoms of hypo/hyperglycemia, what to do about each
- That product must be continued on daily basis; about the consequences of discontinuing the product abruptly
- To avoid OTC medications, herbal preparations, nitrates, or insulin unless approved by prescriber
- That diabetes is lifelong; that product is not a cure, only controls symptoms
- That all food included in diet plan must be eaten to prevent hypoglycemia
- To carry emergency ID and glucagon emergency kit
- ⚠ To report symptoms of hepatic dysfunction (nausea, vomiting, abdominal pain, fatigue, anorexia, dark urine, jaundice)
- That 2 wk is needed to see reduction in blood glucose level and 2-3 mo needed to see full effect of product
- To notify prescriber if oral contraceptives are used
- Not to use if breastfeeding, may be secreted in breast milk
- That a medication guide should be dispensed with each prescription/refill

rosuvastatin (Rx)

(roe-soo'va-sta-tin)

Crestor

Func. class.: Antilipemic

Chem. class.: HMG-CoA reductase inhibitor

ACTION: Inhibits HMG-CoA reductase enzyme, which reduces cholesterol synthesis

USES: As an adjunct for primary hypercholesterolemia (types IIa, IIb) and mixed dyslipidemia, elevated serum triglycerides, homozygous/heterozygous familial hypercholesterolemia (FH), slowing of atherosclerosis, CV disease prophylaxis
Unlabeled uses: MI, stroke prophylaxis (normal LDL)

CONTRAINDICATIONS: Pregnancy (X), breastfeeding, hypersensitivity, active hepatic disease
Precautions: Children, geriatric patients, past hepatic disease, alcoholism, severe acute infections, trauma, hypotension, uncontrolled seizure disorders, severe metabolic disorders, electrolyte imbalances, severe renal impairment, hypothyroidism, Asian patients

DOSAGE AND ROUTES

Hypercholesterolemia
- **Adult: PO** 5-40 mg/day; initial dose 10 mg/day, reanalyze lipid levels at 2-4 wk, adjust dosage accordingly

Homozygous familial hypercholesterolemia
- **Adult: PO** 20 mg/day, max 40 mg

Dose in patients taking cycloSPORINE/gemfibrozil/lopinavir/ritonavir/atazanavir
- **Adult: PO** 5 mg/day, max 10 mg/day

Asian patients/patients with predisposition for myopathy
- **Adult: PO** 5 mg/day

Atherosclerosis slowing
- **Adult: PO** 10 mg/day (for those not taking cycloSPORINE or gemfibrozil)

Heterozygous familial hypercholesterolemia
- **Females ≥1 yr postmenarche and ≥10 yr): PO** 5-20 mg/day individualized

MI/stroke prophylaxis (unlabeled)
- **Adult: PO** 20 mg daily

Renal/hepatic dose
- **Adult: PO** CCr <30 ml/min, 5 mg/day; max 10 mg/day; avoid use with hepatic disease

Available forms: Tabs 5, 10, 20, 40 mg
Administer:
- May be taken at any time of day, with/without food

R

SIDE EFFECTS

CNS: *Headache, dizziness,* insomnia, paresthesia
GI: *Nausea, constipation, abdominal pain, flatus, diarrhea, dyspepsia, heartburn,* kidney failure, liver dysfunction, vomiting
HEMA: Thrombocytopenia, hemolytic anemia, leukopenia
INTEG: *Rash, pruritus*
MS: *Asthenia, muscle cramps, arthritis, arthralgia, myalgia,* myositis, rhabdomyolysis; leg, shoulder, or localized pain
RESP: Rhinitus, sinusitis, *pharyngitis,* increased cough

PHARMACOKINETICS

Peak 3-5 hr, minimal live metabolism (about 10%), 88% protein bound, excreted primarily in feces (90%), crosses placenta, half-life 19 hr, not dialyzable

INTERACTIONS

Increase: hepatotoxicity—alcohol
Increase: rosuvastatin effect—bile acid sequestrants
⚠ **Increase:** myalgia, myositis, rhabdomyolysis—cycloSPORINE, gemfibrozil, niacin, clofibrate, azole antifungals, antiretroviral protease inhibitors, fibric acid derivatives
Increase: bleeding risk—warfarin
Drug/Lab Test
Increase: LFTs

NURSING CONSIDERATIONS

Assess:
• Diet; obtain diet history including fat, cholesterol in diet
• Fasting cholesterol, LDL, HDL, triglycerides at baseline and q4-6wk, then periodically
• Liver function: LFTs at baseline, 12 wk, then q6mo; AST, ALT, LFTs may increase
• Renal function in patients with compromised renal system: BUN, creatinine, I&O ratio
⚠ **Rhabdomyolysis:** muscle pain, tenderness, obtain CPK; if these occur, product may need to be discontinued; for patients with Asian ancestry: increased blood levels, rhabdomyolysis
Perform/provide:
• Storage in cool environment in airtight, light-resistant container
Evaluate:
• Therapeutic response: decreased LDL, cholesterol, triglycerides, increased HDL, slowing CAD
Teach patient/family:
⚠ To report suspected pregnancy; to use contraception while taking product, pregnancy category (X); not to breastfeed
⚠ To report weakness, muscle tenderness, pain, fever; liver injury (jaundice, anorexia, abdominal pain)
• That blood work and follow-up exams will be necessary during treatment
• To report severe GI symptoms, dizziness, headache, muscle pain, weakness
• That previously prescribed regimen will continue: low-cholesterol diet, exercise program, smoking cessation

rufinamide (Rx)

(roo-fin'a-mide)
Banzel
Func. class.: Anticonvulsant
Chem. class.: Triazole derivative

ACTION: May act through action at sodium channels; exact action is unknown

USES: Lennox-Gastaut syndrome
Unlabeled uses: Partial seizures

CONTRAINDICATIONS: Hypersensitivity, familial short QT syndrome
Precautions: Pregnancy (C), breastfeeding, children <16 yr, geriatric patients, renal/hepatic disease, depression, dialysis, hazardous activities, suicidal ideation

DOSAGE AND ROUTES

• **Adult: PO** 400-800 mg/day divided bid, increase by 400-800 mg/day q2days to 3200 mg/day
• **Child ≥4 yr: PO** 10 mg/kg/day divided equally bid; increase by 10 mg/kg/day every other day to 45 mg/kg/day or 3200 mg/day, whichever is less
Available forms: Tabs 200, 400 mg; oral susp 40 mg/ml
Administer:
• **PO tabs:** give with food; may give whole, crushed, or halved
• **Oral susp:** shake well before use, use provided adapter and calibrated oral dosing syringe, insert adapter firmly in neck of bottle before use, keep in place for duration of bottle use; insert dosing syringe into adapter, withdraw dose from inverted bottle; replace cap after each use, use within 90 days of opening, give with food

SIDE EFFECTS

CNS: Dizziness, ataxia, drowsiness, fever, seizures, tremor, fatigue, headache, gait disturbance
EENT: Diplopia, blurred vision, nystagmus
GI: Nausea, hepatitis, vomiting
HEMA: Anemia, leukopenia, neutropenia, thrombocytopenia, lymphadenopathy
INTEG: Rash, urticaria
MISC: Edema, hematuria, influenzae, nephrolithiasis

PHARMACOKINETICS

Peak 4-6 hr, half-life 6-10 hr, metabolized by liver, excreted by kidneys, 34% protein binding

INTERACTIONS

Increase: rufinamide effect—valproate
Decrease: effect of hormonal contraceptives
Decrease: effect of rufinamide—carBAMazepine, phenytoin, primidone, PHENObarbital
Drug/Lab Test
Increase: LFTs

NURSING CONSIDERATIONS

Assess:
• **Seizures:** duration, type, intensity precipitating factors
⚠ Mental status: mood, sensorium, affect, memory (long, short), increased suicidal thoughts/actions
Evaluate:
• Therapeutic response: decrease in severity of seizures
Teach patient/family:
• Not to discontinue product abruptly because seizures may occur
• To avoid hazardous activities until stabilized on product
• To carry emergency ID stating product use
• To notify prescriber if pregnancy is planned or suspected; to use alternative form of contraception because effect of hormonal contraceptives may be decreased
• To consume adequate fluids

salicylic acid topical

See Appendix B

salmeterol (Rx)

(sal-met'er-ole)
Serevent ♣, Serevent Diskus
Func. class.: β_2-Adrenergic agonist, bronchodilator

S

ACTION: Causes bronchodilation by action on β_2 (pulmonary) receptors by increasing levels of cAMP, which relaxes smooth muscle with little effect on heart rate; maintains improvement in FEV from 3 to 12 hr; prevents nocturnal asthma symptoms

USES: Prevention of exercise-induced bronchospasm, COPD, asthma

CONTRAINDICATIONS:

Hypersensitivity to sympathomimetics, tachydysrhythmias, severe cardiac disease, monotherapy treatment of asthma

Precautions: Pregnancy (C), breastfeeding, cardiac disorders, hyperthyroidism, diabetes mellitus, hypertension, closed-angle glaucoma, seizures, acute asthma, as a substitute to corticosteroids, QT prolongation

Black Box Warning: Asthma-related death, children <4 yr

DOSAGE AND ROUTES

• **Adult/child ≥4 yr: INH** 50 mcg (1 inhalation as dry powder) q12hr; exercise-induced bronchospasm 50 mcg (1 inhalation) ½-1 hr before exercise

Available forms: Inhalation powder 50 mcg/blister

Administer:

• Gum, sips of water for dry mouth

• Use 1 hr before exercise for exercise-induced bronchospasm prevention

SIDE EFFECTS

CNS: *Tremors, anxiety,* insomnia, headache, dizziness, fever

CV: Palpitations, tachycardia, hypo/hypertension, angina, dysrhythmias

EENT: Dry nose, irritation of nose and throat

GI: Heartburn, nausea, vomiting, abdominal pain

MS: Muscle cramps

RESP: Bronchospasm, cough

PHARMACOKINETICS

INH: Onset 30-50 min; peak 4 hr; duration 12 hr; metabolized in liver; excreted in urine, breast milk; crosses placenta, blood-brain barrier; protein binding 94%-98%; terminal half-life 3-5 hr

INTERACTIONS

Increase: CV effect—CYP3A4 inhibitors (itraconazole, ketoconazole, nelfinavir, nefazodone, saquinavir)

Increase: action of aerosol bronchodilators

Increase: action of salmeterol—tricyclics, MAOIs

Decrease: salmeterol action—other β-blockers

NURSING CONSIDERATIONS

Assess:

• **Respiratory function:** vital capacity, forced expiratory volume, ABGs, lung sounds, heart rate and rhythm

⚠ **Paradoxical bronchospasm:** dyspnea, wheezing, chest tightness

Black Box Warning: Children should not use this product as monotherapy for asthma, use only with persistent asthma in those whose symptoms are not well-controlled with a long-term asthma product

Perform/provide:

• Storage in foil pouch; do not expose to temp >86° F (30° C); discard 6 wk after removal from foil pouch

Evaluate:

• Therapeutic response: absence of dyspnea, wheezing

Teach patient/family:

• Not to use for exercise-induced bronchospasm, never to exhale into diskus, to hold level, keep mouthpiece dry

• Not to use OTC medications because extra stimulation may occur

• Review package insert with patient

• To avoid getting powder in eyes

• To avoid smoking, smoke-filled rooms, persons with respiratory infections

• Not for treatment of acute exacerbation, a fast-acting β-blocker should be used instead

⚠ To immediately report dyspnea after use if ≥1 canister is used in 2 mo time

TREATMENT OF OVERDOSE:

β_2-Adrenergic blocker

sargramostim (GM-CSF) (Rx)

(sar-gram'oh-stim)

Leukine, GM-CSF

Func. class.: Biologic modifier

Chem. class.: Granulocyte macrophage colony-stimulating factor (GM-CSF)

Do not confuse:
Leukine/leucovorin/Leukeran

ACTION: Stimulates proliferation and differentiation of hematopoietic progenitor cells (granulocytes, macrophages)

USES: Acceleration of myeloid recovery in patients with non–Hodgkin's lymphoma, acute lymphoblastic leukemia, acute myelogenous leukemia, autologous bone marrow transplantation in Hodgkin's disease; bone marrow transplantation failure or engraftment delay, mobilization and transplant of peripheral blood progenitor cells (PBPCs)
Unlabeled uses: Aplastic anemia, Crohn's disease, HIV, ganciclovir- or zidovudine-induced neutropenia, malignant melanoma

CONTRAINDICATIONS: Neonates; hypersensitivity to GM-CSF, benzyl alcohol, yeast products; excessive leukemic myeloid blast in bone marrow, peripheral blood
Precautions: Pregnancy (C), breastfeeding, children; lung/cardiac/renal/hepatic disease; pleural, pericardial effusions, peripheral edema, leukocytosis, mannitol hypersensitivity, hepatic/renal disease

DOSAGE AND ROUTES

Myeloid reconstitution after autologous bone marrow transplantation
• **Adult: IV** 250 mcg/m²/day × 14 days; give over 2 hr, begin 2-4 hr after bone marrow inf, not <24 hr after last dose of antineoplastics and 12 hr after last dose of radiotherapy, bone marrow transplantation failure, or engraftment delay
Acceleration of myeloid recovery
• **Adult: IV** 250 mcg/m²/day × 14 days; give over 2 hr; may repeat in 7 days, may repeat 500 mcg/m²/day × 14 days after another 7 days if no improvement
Mobilization of PBPCs
• **Adult: IV/SUBCUT** 250 mcg/m²/day during collection of PBPCs
After PBPC transplantation
• **Adult: IV/SUBCUT** 250 mcg/m²/day until ANC >1500 cells/mm³ × 3 days
Aplastic anemia (unlabeled)
• **Adult: SUBCUT** 250-500 mcg/day or 5 mcg/kg/day × 14-90 days, used with erythropoietin or immunosuppressive therapy
Malignant melanoma (unlabeled)
• **Adult: SUBCUT** 125 mcg/m²/day × 14 days, alternate with 14 days off
HIV (unlabeled)
• **Adult: SUBCUT** 250 mcg/day 3×/wk for ≤20 mo
Available forms: Powder for inj lyophilized 250 mcg; sol for inj 500 mcg/ml
Administer:
SUBCUT route
• No further dilution of reconstituted sol is needed; take care not to inject intradermally
Intermittent IV INF route
• After reconstituting with 1 ml sterile water for inj without preservative; do not reenter vial; discard unused portion; direct reconstitution sol at side of vial; rotate contents; do not shake
• Dilute in 0.9% NaCl inj to prepare IV inf; if final concentration is <10 mcg/ml, add human albumin to make final conc of 0.1% to NaCl before adding sargramostim to prevent adsorption; for a final conc of 0.1% albumin, add 1 mg human albumin/1 ml 0.9% NaCl inj run over 2 hr **(bone marrow transplant or failure of graft)**; over 4 hr **(chemotherapy for AML)**; over 24 hr as cont inf **(PBPCs)**; give within 6 hr after reconstitution

Y-site compatibilities: Amikacin, aminophylline, aztreonam, bleomycin, butorphanol, calcium gluconate, CARBOplatin, carmustine, ceFAZolin, cefepime, cefotaxime, cefoTEtan, ceftizoxime, cefTRIAXone, cefuroxime, cimetidine, CISplatin, clindamycin, cyclophosphamide, cycloSPORINE, cytarabine, dacarbazine, DACTINomycin, dexamethasone, diphenhydrAMINE, DOPamine, DOXOrubicin, doxycycline, droperidol, etoposide, famotidine, fentaNYL, floxuridine, fluconazole, fluorouracil, furosemide, gentamicin, granisetron, heparin, IDArubicin, ifosfamide, immune globulin, magnesium sulfate, mannitol, mechlorethamine, meperidine, mesna, methotrexate, metoclopramide, metroNIDAZOLE, minocycline, mitoXANtrone, netilmicin, pentostatin, piperacillin/tazobactam, potassium chloride, prochlorperazine, promethazine, ranitidine, teniposide, ticarcillin, ticarcillin-clavulanate, trimethoprim-sulfamethoxazole, vinBLAStine, vinCRIStine, zidovudine

SIDE EFFECTS

CNS: Fever, malaise, CNS disorder, weakness, chills, dizziness, syncope, headache
CV: Transient supraventricular tachycardia, peripheral edema, pericardial effusion, hypotension, tachycardia
GI: Nausea, vomiting, diarrhea, anorexia, GI hemorrhage, stomatitis, liver damage, hyperbilirubinemia
GU: Urinary tract disorder, abnormal kidney function
HEMA: Blood dyscrasias, hemorrhage
INTEG: Alopecia, rash, peripheral edema
MS: Bone pain, myalgia
RESP: Dyspnea

PHARMACOKINETICS

Half-life elimination: IV 60 min, SUBCUT 2-3 hr; detected within 5 min after administration, peak 2 hr

INTERACTIONS

• Do not use product concomitantly with antineoplastics or radiation, separate by ≥24 hr
Increase: myeloproliferation—lithium, corticosteroids
Drug/Lab Test
Increase: bilirubin, BUN, creatinine, eosinophils, LFTs, leukocytes

NURSING CONSIDERATIONS

Assess:
⚠ Blood studies: CBC, differential count before treatment, 2 × weekly; leukocytosis may occur (WBC >50,000 cells/mm³, ANC >20,000 cells/mm³), platelets; if ANC >20,000/mm³ or 10,000/mm³ after nadir has occurred or platelets >500,000/mm³, reduce dose by ½ or discontinue; if blast cells occur, discontinue
• Renal, hepatic studies before treatment: BUN, creatinine, urinalysis; AST, ALT, alk phos; 2 × weekly monitoring is needed in renal/hepatic disease
• **Hypersensitivity,** rashes, local inj site reactions; usually transient
• Body weight, hydration status; increased fluid retention in cardiac disease; pulmonary function
• Constitutional symptoms: asthenia, chills, fever, headache, malaise
• Myalgia, arthralgia in legs, feet; use analgesics, antipyretics
Perform/provide:
• **Gasping syndrome in neonates:** due to benzyl alcohol hypersensitivity
• Storage in refrigerator; do not freeze
Evaluate:
• Therapeutic response: WBC and differential recovery
Teach patient/family:
• To report dyspnea to health care provider
• Review all aspects of product use

saxagliptin (Rx)

(sax-a-glip'tin)

Onglyza

Func. class.: Antidiabetic, oral

Chem. class.: Dipeptidyl-peptidase-4 inhibitor (DPP-4 inhibitor)

Do not confuse:
saxagliptin/sitaGLIPtin

ACTION: Slows the inactivation of incretin hormones; improves glucose homeostasis, improves glucose-dependent insulin synthesis, lowers glucagon secretions, and slows gastric emptying time

USES: In adults, type 2 diabetes mellitus as monotherapy or in combination with other antidiabetic agents

CONTRAINDICATIONS: Hypersensitivity, diabetic ketoacidosis (DKA), type 1 diabetes
Precautions: Pregnancy (B), geriatric patients, GI obstruction, surgery, thyroid/renal/hepatic disease, trauma

DOSAGE AND ROUTES

• **Adult: PO** 2.5-5 mg; may use with other antidiabetic agents other than insulin; if used with insulin, a lower dose is needed
Renal dose
• **Adult: PO** CCr ≤50 ml/min, 2.5 mg daily
Available forms: Tabs 2.5, 5 mg
Administer:
PO route
• May be taken with/without food

SIDE EFFECTS

CNS: *Headache*
ENDO: Hypoglycemia (renal impairment)
GI: *Nausea, vomiting,* abdominal pain
INTEG: Urticaria, angioedema, anaphylaxis
MISC: Lymphopenia, peripheral edema

PHARMACOKINETICS

Rapidly absorbed, excreted by the kidneys (unchanged 24%), terminal half-life 2.5 hr, 3.1 hr metabolite, peak 2 hr, duration 24 hr

INTERACTIONS

Increase: hypoglycemia—androgens, insulins, β-blockers, cimetidine, corticosteroids, salicylates, MAOIs, fibric acid derivatives, FLUoxetine, insulin, sulfonylureas, ACE inhibitors; CYP3A4/5 inhibitors
Drug/Herb
Increase: antidiabetic effect—garlic, horse chestnut
Drug/Lab Test
Decrease: lymphocytes, glucose

NURSING CONSIDERATIONS

Assess:
• **Hypoglycemic reactions** (sweating, weakness, dizziness, anxiety, tremors, hunger); monitor blood glucose, HbA1c
renal studies: BUN, creatinine during treatment
Perform/provide:
• Conversion from other antidiabetic agents; change may be made with gradual dosage change
• Storage in tight container at room temp
Evaluate:
• Therapeutic response: decrease in polyuria, polydipsia, polyphagia; clear sensorium; absence of dizziness; stable gait, blood glucose at normal level
Teach patient/family:
• To perform regular self-monitoring of blood glucose using blood-glucose meter
• About the symptoms of hypo/hyperglycemia, what to do about each
• That product must be continued on daily basis; about consequences of discontinuing product abruptly
• To avoid OTC medications, alcohol, digoxin, exenatide, insulins, nateglinide, repaglinide, and other products that lower blood glucose unless approved by prescriber

S

- That diabetes is lifelong; that this product is not a cure, only controls symptoms
- That all food included in diet plan must be eaten to prevent hypo/hyperglycemia
- To carry emergency ID
- To take product without regard to food
- To notify prescriber when surgery, trauma, stress, occurs because dose may need to be adjusted

scopolamine (Rx)

(skoe-pol'a-meen)

Maldemar, Scopace, Transderm Scop

Func. class.: Cholinergic blocker

Chem. class.: Belladonna alkaloid

ACTION: Inhibits acetylcholine at receptor sites in autonomic nervous system, which controls secretions, free acids in stomach; blocks central muscarinic receptors, which decreases involuntary movements

USES: Preoperatively to produce amnesia, sedation and to decrease secretions; motion sickness, parkinsonian symptoms

CONTRAINDICATIONS: Hypersensitivity, closed-angle glaucoma, myasthenia gravis, GI/GU obstruction, hypersensitivity to belladonna, barbiturates

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, prostatic hypertrophy, CHF, hypertension, dysrhythmia, gastric ulcer, renal/hepatic disease, hiatal hernia, GERD, ulcerative colitis, hyperthyroidism

DOSAGE AND ROUTES

Motion sickness

- **Adult: TD** 1 patch 4 hr before travel and q3days

Parkinsonian symptoms

- **Adult: PO** 0.4-0.8 mg q8hr

Preoperatively

- **Adult: IM/IV/SUBCUT** 0.32-0.65 mg; **TD** apply 1 patch PM before surgery or 1 hr before c-section

Nausea and vomiting

- **Adult: SUBCUT** 0.6-1 mg
- **Child: SUBCUT** 0.006 mg/kg; max 0.3 mg/dose

Available forms: Inj 0.4 mg/ml; TD patch 72 hr (1.5 mg)

Administer:

- Parenteral dose with patient recumbent to prevent postural hypotension
- Parenteral dose slowly; keep patient in bed for ≥1 hr after dose
- With or after meals for GI upset; may give with fluids other than water
- At bedtime to avoid daytime drowsiness in patients with parkinsonism
- With analgesic to avoid behavioral changes when given preoperatively

Direct IV route

- Dilute with equal sterile water; give over 2-3 min

Syringe compatibilities: Atropine, benzquinamide, butorphanol, chlorproMAZINE, cimetidine, diamorphine, dimenhyDRINATE, diphenhydrAMINE, droperidol, fentaNYL, glycopyrrolate, HYDROmorphone, hydrOXYzine, meperidine, metoclopramide, midazolam, morphine, nalbuphine, oxyCODONE, pentazocine, PENTobarbital, perphenazine, prochlorperazine, promazine, promethazine, ranitidine, SUFentanil, thiopental

Y-site compatibilities: FentaNYL, heparin, hydrocortisone, HYDROmorphone, methadone, morphine, potassium chloride, propofol, SUFentanil, vit B/C

SIDE EFFECTS

CNS: Confusion, anxiety, restlessness, irritability, delusions, hallucinations, headache, sedation, depression, incoherence, dizziness, excitement, delirium, flushing, weakness, fatigue, loss of memory

CV: Palpitations, tachycardia, postural hypotension, paradoxical bradycardia

EENT: Blurred vision, photophobia, dilated pupils, difficulty swallowing, mydriasis, cycloplegia
GI: *Dryness of mouth, constipation,* nausea, vomiting, abdominal distress, paralytic ileus
GU: Urinary hesitancy, retention
INTEG: Urticaria, dry skin
MISC: Suppression of breastfeeding, nasal congestion, decreased sweating

PHARMACOKINETICS

Excreted in urine, bile, feces (unchanged), half-life 8 hr
SUBCUT/IM: Peak 30-60 min, duration 7 hr
IV: Peak 10-15 min, duration 2 hr

INTERACTIONS

Increase: anticholinergic effect—alcohol, opioids, antihistamines, phenothiazines, tricyclics

NURSING CONSIDERATIONS

Assess:
- VS periodically
- I&O ratio; retention commonly causes decreased urinary output
- **Parkinsonism, EPS:** shuffling gait, muscle rigidity, involuntary movements; affect, mood, CNS depression, worsening of mental symptoms during early therapy
- Urinary hesitancy, retention; palpate bladder if retention occurs
- Constipation; increase fluids, bulk, exercise
- Tolerance during long-term therapy; dose may have to be increased or changed

Perform/provide:
- Storage at room temp in light-resistant container
- Hard candy, frequent drinks, sugarless gum to relieve dry mouth

Evaluate:
- Therapeutic response: decreased secretions

Teach patient/family:
- Not to discontinue product abruptly; to taper off over 1 wk
- To avoid driving, other hazardous activities because drowsiness may occur
- To avoid OTC medication: cough, cold preparations with alcohol, antihistamines unless directed by prescriber
- **Transdermal route:** to apply with clean, dry hands; to wash, dry hands before and after applying to surface behind ear; to press patch firmly
- To avoid hazardous activities, activities requiring alertness because dizziness may occur
- To change patch q72hr
- To apply at least 4 hr before traveling
- If blurred vision, severe dizziness, drowsiness occurs, to discontinue use, use another type of antiemetic, or to rotate patch to other ear
- To read label of all OTC medications; if any scopolamine is found in product, avoid use
- To keep out of children's reach

scopolamine ophthalmic

See Appendix B

selegiline (Rx)

(se-le′ji-leen)
Eldepryl, Emsam, Zelapar
Func. class.: Antiparkinson agent
Chem. class.: MAOI, type B

Do not confuse:
Eldepryl/enalapril

S

ACTION: Increased dopaminergic activity by inhibition of MAO type B activity; not fully understood

USES: Adjunct management of Parkinson's disease for patients being treated with levodopa/carbidopa who had poor response to therapy; depression (transdermal)
Unlabeled uses: Alzheimer's disease, depression

CONTRAINDICATIONS: Children/adolescents (suicide/hypertensive crisis), hypersensitivity, breastfeeding
Precautions: Pregnancy (C)

DOSAGE AND ROUTES

• **Adult: PO** 10 mg/day given with levodopa/carbidopa in divided doses, 5 mg at breakfast and lunch; after 2-3 days, begin to reduce dose of levodopa/carbidopa 10%-30%; **ORAL DISINTEGRATING** 1.25 mg (1 tab) × 6 wk or more initially then 2.5 mg (2 tabs) dissolved on tongue daily before breakfast; max 2.5 mg/day; **TRANSDERMAL** 6 mg/24 hr initially, increase by 3 mg/24 hr at ≥2 wk, up to 12 mg/24 hr if needed

Alzheimer's disease (unlabeled)

• **Adult: PO** 5 mg bid AM, PM

Available forms: Tabs 5 mg; caps 5 mg; oral disintegrating tabs 1.25 mg; transdermal 6 mg/24 hr (20 mg/20 cm^2), 9 mg/24 hr (30 mg/30 cm^2), 12 mg/24 hr (40 mg/40 cm^2)

Administer:

PO route

⚠ Do not use in children due to risk for hypertensive crisis

• Product until NPO before surgery
• Adjust dosage to response
• With meals; limit protein taken with product
• Dosing bid in AM and afternoon; avoid PM or bedtime dosing
• At doses of <10 mg/day because of risks associated with nonselective inhibition of MAO
• **Oral disintegrating tab:** peel back foil; remove tab, do not push through foil; place tab on tongue, allow to dissolve, swallow with saliva

Transdermal route

• Apply to dry, intact skin on upper torso, upper thigh, or outer surface of upper arm q12hr

SIDE EFFECTS

CNS: Increased tremors, chorea, restlessness, blepharospasm, increased bradykinesia, grimacing, tardive dyskinesia, dystonic symptoms, involuntary movements, increased apraxia, hallucinations, *dizziness*, mood changes, nightmares, delusions, lethargy, apathy, overstimulation, sleep disturbances, headache, migraine, numbness, muscle cramps, confusion, anxiety, tiredness, vertigo, personality change, back/leg pain, suicide in child/adolescent, suicidal ideation in adults

CV: Orthostatic hypotension, hypo/hypertension, dysrhythmia, palpitations, angina pectoris, tachycardia, edema, sinus bradycardia, syncope, hypertensive crisis (children)

EENT: Diplopia, dry mouth, blurred vision, tinnitus

GI: Nausea, vomiting, constipation, weight loss, anorexia, diarrhea, heartburn, rectal bleeding, poor appetite, dysphagia, xerostomia

GU: Slow urination, nocturia, prostatic hypertrophy, urinary hesitation, retention, frequency, sexual dysfunction

INTEG: Increased sweating, alopecia, hematoma, rash, photosensitivity, facial hair

RESP: Asthma, SOB

PHARMACOKINETICS

Absorption (tab) 40-90 min, (oral disintegrating tab) 10-15 min; peak ½-2 hr; rapidly metabolized (active metabolites: *N*-desmethyldeprenyl, amphetamine, methamphetamine); metabolites excreted in urine; half-life 10 hr, orally disintegrating tab 1.3 hr; protein binding up to 85%

INTERACTIONS

⚠ Fatal interaction: opioids (especially meperidine); do not administer together
⚠ Serotonin syndrome (confusion, seizures, fever, hypertension, agitation); death—FLUoxetine, PAROxetine, sertraline, fluvoxaMINE (discontinue 5 wk before selegiline treatment); do not use together
⚠ Fatal interaction: do not use with tricyclics

Increase: side effects of levodopa/carbidopa
Increase: unusual behavior, psychosis —dextromethorphan
Increase: hypotension—antihypertensives
Drug/Lab Test
Decrease: VMA
False positive: urine ketones, urine glucose
False negative: urine glucose (glucose oxidase)
False increase: uric acid, urine protein

NURSING CONSIDERATIONS

Assess:
• **Parkinson's symptoms:** decreased rigidity, unsteady gait, weakness, tremors
• Cardiac status: tachycardia/bradycardia; B/P, respiration throughout treatment
• Mental status: affect, mood, behavioral changes, depression; perform suicide assessment on all patients, suicidal ideation may occur
⚠ Opioids; if patient has received, do not administer selegiline, fatal reactions have occurred
Perform/provide:
• Assistance with ambulation during beginning therapy
Evaluate:
• Therapeutic response: decrease in akathisia, improved mood
Teach patient/family:
• To change positions slowly to prevent orthostatic hypotension
• **Hypertensive crisis:** nausea, vomiting, sweating, agitation, change in mental status, headache, chest pain; to notify prescriber immediately
• **Serotonin syndrome:** to report twitching, sweating, shivering, diarrhea to prescriber immediately
• To use product exactly as prescribed; if discontinued abruptly, parkinsonian crisis may occur
• **Pregnancy:** to report if pregnancy is planned or suspected, pregnancy (C), avoid breastfeeding
• To use during the day to prevent insomnia
• To avoid heating pads, hot tubs when using transdermal products
• To avoid hazardous activities until response is known
• To avoid foods high in tyramine: cheese, pickled products, wine, beer, large amounts of caffeine
⚠ Not to exceed recommended dose of 10 mg (PO) because this might precipitate hypertensive crisis; to report severe headache, other unusual symptoms

TREATMENT OF OVERDOSE:

IV fluids for hypertension, IV dilute pressure agent for B/P titration

selenium topical

See Appendix B

sertraline (Rx)

(ser'tra-leen)
Zoloft
Func. class.: Antidepressant
Chem. class.: SSRI

Do not confuse:
Zoloft/Zocor

ACTION: Inhibits serotonin reuptake in CNS; increases action of serotonin; does not affect dopamine, norepinephrine

USES: Major depressive disorder, obsessive-compulsive disorder (OCD), posttraumatic stress disorder (PTSD), panic disorder, social anxiety disorder, premenstrual dysphoric disorder (PMDD)
Unlabeled uses: Premature ejaculation, pruritus with cholestatic liver disease, hot flashes during menopause, breast cancer patients taking tamoxifen; men with prostate cancer secondary to androgen-deprivation therapy

S

CONTRAINDICATIONS:

Hypersensitivity to this product or SSRIs

Precautions: Pregnancy (C), breastfeeding, geriatric patients, renal/hepatic disease, epilepsy, recent MI, latex sensitivity (dropper of oral conc)

Black Box Warning: Children, suicidal ideation

DOSAGE AND ROUTES

Major depression/OCD

• **Adult/geriatric patient/adolescent (unlabeled): PO** 25-50 mg/day; may increase to max of 200 mg/day; do not change dose at intervals of <1 wk; administer daily in AM or PM

• **Child 6-12 yr (unlabeled): PO** 25 mg/day, increase by 25-50 mg/wk

Premenstrual dysphoric disorder

• **Adult: PO** 50-150 mg nightly

Premature ejaculation (unlabeled)

• **Adult: PO** 50 mg/day

Pruritus (unlabeled)

• **Adult: PO** 50-100 mg/day

Hot flashes (unlabeled)

• **Adult: PO** 50 mg/day × 4 wk; men with prostate cancer (androgen deprivation), 50-100 mg/day

Hepatic dose

• **Adult: PO** Use lower dose or less frequent dosing intervals

Available forms: Tabs 25, 50, 100 mg; oral sol 20 mg/ml

Administer:

• Increased fluids, bulk in diet for constipation, urinary retention

• With food, milk for GI symptoms

• Crushed if patient is unable to swallow medication whole

• Sugarless gum, hard candy, frequent sips of water for dry mouth

• **Oral conc:** dilute before use with 4 oz (½ cup) of water, orange juice, ginger ale, or lemon/lime soda; do not mix with other liquids

• Avoid use with other CNS depressants

SIDE EFFECTS

CNS: *Insomnia, agitation, somnolence, dizziness, headache, tremor, fatigue,* paresthesia, twitching, confusion, ataxia, gait abnormality (geriatric patients), seizures, neuroleptic malignant-syndrome–like reaction, serotonin syndrome, suicidal ideation

CV: Palpitations, chest pain

EENT: Vision abnormalities, yawning

ENDO: SIADH (geriatric patients)

GI: *Diarrhea, nausea, constipation, anorexia, dry mouth,* dyspepsia, *vomiting, flatulence,* weight gain/loss

GU: *Male sexual dysfunction,* micturition disorder

INTEG: Increased sweating, rash, hot flashes

MISC: Hyponatremia

PHARMACOKINETICS

PO: Peak 4.5-8.4 hr; steady state 1 wk; plasma protein binding 98%; elimination half-life 26 hr; extensively metabolized; metabolite excreted in urine, bile; weak inhibitor of CYP3A4, moderate inhibitor of CYP2D6

INTERACTIONS

• Altered lithium levels: lithium

• Disulfiram reaction: disulfiram and oral conc due to alcohol content

⚠ Fatal reactions: MAOIs, pimozide

Increase: sertraline levels—cimetidine, warfarin, other highly protein-bound products

Increase: effects of antidepressants (tricyclics), diazepam, TOLBUTamide, warfarin, benzodiazepines, SUMAtriptan, phenytoin, cloZAPine

Increase: bleeding risk—anticoagulants, NSAIDs, thrombolytic, platelet inhibitors, salicylates

Increase: serotonin syndrome, neuroleptic malignant syndrome—SSRIs, SNRIs, serotonin-receptor agonists, tricyclics, sibutramine, traZODone, busPIRone, linezolid, traMADol

Drug/Herb

Increase: of SSRI, serotonin syndrome—St. John's wort, SAM-e, tryptophan; do not use together

Increase: CNS effect—kava kava, valerian

Drug/Lab Test

Increase: AST, ALT

False positive: urine screen for benzodiazepines

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Mental status: mood, sensorium, affect, suicidal tendencies (child/young adult), increase in psychiatric symptoms, depression, panic attacks, OCD, PTSD, social anxiety disorder

⚠ **Serotonin syndrome** (hyperthermia, hypertension, rigidity, delirium, coma, myoclonus) or neuroleptic malignant-like syndrome (muscle cramps, fever, unstable B/P, agitation, tremors, mental changes)

⚠ **Bleeding** (platelet serotonin depletion): GI bleeding, ecchymoses, epistaxis, hematomas, petechiae, hemorrhage

- LFTs at baseline and periodically
- B/P (lying/standing), pulse q4hr; if systolic B/P drops 20 mm Hg, hold product, notify prescriber; VS q4hr in patients with CV disease
- Weight q wk; appetite may decrease with product
- Urinary retention, constipation, especially in geriatric patients
- Alcohol consumption; hold dose until morning

Perform/provide:

- Storage at room temp; do not freeze

Evaluate:

- Therapeutic response: significant improvement in depression, OCD

Teach patient/family:

- That therapeutic effect may take ≥1 wk
- To use caution when driving, performing other activities requiring alertness because drowsiness, dizziness, blurred vision may occur
- Not to discontinue medication quickly after long-term use; may cause nausea, headache, malaise
- To avoid alcohol
- May be taken without regard to food
- **Serotonin syndrome:** agitation, nausea, vomiting, diarrhea, twitching, sweating, shivering; report to prescriber immediately
- To notify prescriber if pregnant or if planning to become pregnant, pregnancy (C) or breastfeed

Black Box Warning: That suicidal thoughts/behaviors may occur in children/adolescents

sildenafil (Rx)

(sil-den'a-fil)

Revatio, Viagra

Func. class.: Erectile agent, antihypertensive, peripheral vasodilator

Chem. class.: Phosphodiesterase type-5 inhibitor

Do not confuse:

Viagra/Allegra

ACTION: Enhances the effect of nitric oxide (NO) by inhibiting phosphodiesterase type 5 (PDE5), which is necessary for degrading cGMP in the corpus cavernosum

USES: Treatment of erectile dysfunction, improvement in exercise ability, pulmonary hypertension

Unlabeled uses: Sexual dysfunction (women); lower urinary tract symptoms and erectile dysfunction (with alfuzosin); altitude sickness, Raynaud's disease

CONTRAINDICATIONS: Hypersensitivity to this product or nitrates

Precautions: Pregnancy (B), anatomical penile deformities, sickle cell anemia, leukemia, multiple myeloma, retinitis pigmentosa, bleeding disorders, active peptic ulceration, CV/renal/hepatic disease, multiproduct antihypertensive regimens, geriatric patients

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DOSAGE AND ROUTES

Erectile dysfunction (Viagra only)

• **Adult male <65 yr: PO** 50 mg 1 hr before sexual activity; may be increased to 100 mg or decreased to 25 mg; max 1×/day

• **Adult ≥65 yr (male): PO** 25 mg as needed about 1 hr before sexual activity

Renal/hepatic dose

• **Adult: PO** (Child-Pugh A, B) 25 mg, take 1 hr before sexual activity; max 1×/day; CCr <30 ml/min, 25 mg starting dose

Pulmonary hypertension (Revatio only)

• **Adult: PO** 20 mg tid; take 4-6 hr apart; IV BOL 10 mg tid

Pulmonary hypertension induced by altitude sickness (unlabeled)

• **Adult: PO** 40 mg 6-8 hr after arriving at 14,272 ft, then 40 mg tid × 6 days

Anorgasmy in antidepressant therapy/sexual dysfunction in women (unlabeled)

• **Adult: PO** 50 mg 60-90 min prior to sexual activity

Available forms: Tabs 20, 25, 50, 100 mg; sol for inj 10 mg/12.5 ml

Administer:

• **Erectile dysfunction:** give approximately 1 hr before sexual activity; do not use more than 1×/day, give on empty stomach for better absorption

• **Pulmonary hypertension:** give 3×/day, 4-6 hr apart

SIDE EFFECTS

CNS: *Headache, flushing, dizziness,* transient global amnesia, seizures

CV: MI, sudden death, CV collapse, TIAs, ventricular dysrhythmias, CV hemorrhage

MISC.: *Dyspepsia, nasal congestion, UTI, abnormal vision, diarrhea, rash,* nonarteritic ischemic optic neuropathy, hearing loss, priapism, sickle cell crisis

PHARMACOKINETICS

Rapidly absorbed; bioavailability 40%; metabolized by P45 CYP3A4, 2C9 in the liver (active metabolites); terminal half-life 4 hr; peak 15-30 min; reduced absorption with high-fat meal; excreted in feces, urine

INTERACTIONS

⚠ Do not use with nitrates; fatal fall in B/P

Increase: sildenafil levels—cimetidine, erythromycin, ketoconazole, itraconazole, antiretroviral protease inhibitors, tacrolimus

Decrease: sildenafil levels—CYP-450 inducers, rifampin, barbiturates, bosentan, carBAMazepine, dexamethasone, phenytoin, nevirapine, rifabutin, troglitazone; antacids

Decrease: B/P—α-blockers, alcohol, amlodipine, angiotensin II receptor blockers

Drug/Food

Increase: product effect—grapefruit

Decrease: absorption—high-fat meal

NURSING CONSIDERATIONS

Assess:

• **Phosphodiesterase type 5 inhibitors with lopinavir/ritonavir (Kaletra):** assess for hypotension, visual changes, prolonged erection, syncope; give only 25 mg q48hr and monitor for adverse reactions

• Erectile dysfunction prior to use

⚠ Any severe loss of vision while taking this or any similar products; products should not be used

⚠ Use of organic nitrates that should not be used with this product

• **MI, sudden death, CV collapse:** those with an MI within 6 mo, resting hypotension <90/50, resting hypertension >170/100, fluid depletion should use this product cautiously; may occur right after sexual activity to days afterward

• **Sickle cell crisis (vasoocclusive crisis):** when used for pulmonary hypertension, may require hospitalization

• Cardiac status, hemodynamic parameters, exercise tolerance in pulmonary hypertension: B/P, pulse

Evaluate:

• Therapeutic response: decreasing pulmonary hypertension/improved exercise tolerance; ability to perform sexually (male)

Teach patient/family:

• That product does not protect against sexually transmitted diseases, including HIV

• That product absorption is reduced with a high-fat meal

• That product should not be used with nitrates in any form

• That tabs may be split

⚠ To notify prescriber immediately and to stop taking product if vision/hearing loss occurs or erection lasts >4 hr

• That erections lasting >4 hr may occur, report to prescriber immediately

• Do not use more than 100 mg in 24 hr

silodosin (Rx)

(si-lo′do-seen)

Rapaflo

Func. class.: Selective α_1-adrenergic blocker, BPH agent

Chem. class.: Sulfamoylphenethylamine derivative

ACTION: Binds preferentially to α_{1A}-adrenoceptor subtype located mainly in the prostate

USES: Symptoms of benign prostatic hyperplasia (BPH)

CONTRAINDICATIONS: Hypersensitivity, renal failure, hepatic disease

Precautions: Pregnancy (B), breastfeeding, children, females, geriatric patients, renal/hepatic disease, hypotension, ocular surgery, orthostatic hypotension, prostate cancer, syncope

DOSAGE AND ROUTES

• **Adult: PO** 8 mg/day with meal; max 8 mg/day

Renal dose

• **Adult: PO** CCr 30-49 ml/min, 4 mg/day; CCr <30 ml/min, not recommended

Available forms: Cap 4, 8 mg

Administer:

• Give with meal at same time each day

• Cap may be opened and sprinkled in applesauce

SIDE EFFECTS

CNS: *Dizziness, headache,* asthenia, insomnia, syncope

CV: Orthostatic hypotension

EENT: Nasal congestion, rhinorrhea, sinusitis

GI: Diarrhea, abdominal pain, jaundice

GU: Abnormal ejaculation, priapism, urinary incontinence

HEMA: Purpura

PHARMACOKINETICS

Decreased absorption with high-fat/high-calorie meal, half-life of metabolite 24 hr, metabolized in liver, excreted via urine, extensively protein bound (97%)

INTERACTIONS

Increase: silodosin effect—CYP3A4 inhibitors (clarithromycin, itraconazole, ritonavir, antiretroviral protease inhibitors, aprepitant, chloramphenicol, conivaptan, dalfopristin, danazol, delavirdine, efavirenz, fosaprepitant, fluconazole, fluvoxaMINE, imatinib, isoniazid, mifepristone, nefazodone, tamoxifen, telithromycin, troleandomycin, voriconazole, zileuton, zafirlukast)

Drug/Food

Increase: silodosin effect—grapefruit juice

Drug Lab/Test

Increase: LFTs

NURSING CONSIDERATIONS

Assess:

• **Prostatic hyperplasia:** change in urinary patterns at baseline and through-

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out treatment, testing for prostate cancer, before administration is recommended
• BUN, uric acid, urodynamic studies (urinary flow rates, residual volume)
• I&O ratios, weight daily; edema, report weight gain or edema
• B/P, monitor for orthostatic hypotension

Perform/provide:
• Storage at room temp; protect from light and moisture

Evaluate:
• Therapeutic response: decreased symptoms of BPH

Teach patient/family
• Not to drive, operate machinery until effect known
• Not to use with grapefruit juice
• To take with same meal each day

silver nitrate 1% ophthalmic
See Appendix B

silver nitrate 1% sulfacetamide sodium ophthalmic
See Appendix B

silver sulfADIAZINE topical
See Appendix B

simethicone (OTC, Rx)
(si-meth'i-kone)
Barriere ♣, Equaline Extra Strength Gas Relief, Gas Relief ♣, Gas-Relief, Gas-X, Good Sense Ultra Strength Gas Relief, Mylanta Gas Relief, Mylanta Gas, Mylicon, Ovol ♣, Phazyme, Top Care Gas Relief Extra Strength, Walgreens Gas Relief
Func. class.: Antiflatulent

Do not confuse:
Mylicon/Mylanta Gas

ACTION: Disperses/prevents mucus gas pockets in GI system, lowers surface tension of gas bubbles

USES: Flatulence
Unlabeled uses: Dyspepsia

CONTRAINDICATIONS: Hypersensitivity, GI obstruction/perforation
Precautions: Pregnancy (C), abdominal pain, fistula, hiatal hernia

DOSAGE AND ROUTES
• **Adult and child >12 yr: PO** 40-125 mg after meals and at bedtime prn, max 500 mg/day
• **Child 2-12 yr: PO** 40-50 mg after meals and at bedtime prn, max 240 mg/day
• **Child <2 yr: PO** 20 mg qid prn

Available forms: Chew tabs 40, 150, 166 mg; tabs 60, 80, 95, 125 mg; drops 20 mg/0.3 ml, 95 mg/1.425 ml; caps 95, 180 mg; soft gel caps 125, 180 mg; oral dissolving film 62.5 mg

Administer:
• After meals, at bedtime; shake susp well before giving; chew tabs should be chewed

SIDE EFFECTS

GI: Belching, rectal flatus, diarrhea

NURSING CONSIDERATIONS

Assess:
- Reason for excess gas production, decreased bowel sounds, recent surgery, other GI conditions

Evaluate:
- Therapeutic response: reduction of abdominal gas, discomfort

Teach patient/family:
- That tablets must be chewed
- To shake susp well before pouring

simvastatin (Rx)

(sim-va-sta'tin)

Zocor

Func. class.: Antilipemic

Chem. class.: HMG-CoA reductase inhibitor

Do not confuse:
Zocor/Cozaar/Zoloft

ACTION: Inhibits HMG-CoA reductase enzyme, which reduces cholesterol synthesis

USES: As an adjunct for primary hypercholesterolemia (types IIa, IIb), isolated hypertriglyceridemia (Frederickson type IV) and type III hyperlipoproteinemia, CAD, heterozygous familial hypercholesterolemia

CONTRAINDICATIONS: Pregnancy (X), breastfeeding, hypersensitivity, active hepatic disease

Precautions: Past hepatic disease, alcoholism, severe acute infections, trauma, severe metabolic disorders, electrolyte imbalances, Chinese patients

DOSAGE AND ROUTES

- **Adult: PO** 20-40 mg/day in PM initially; usual range 5-40 mg/day in PM, max 40 mg/day for most patients, max 80 mg/day for patients taking 80 mg/day chronically without myopathy; dosage adjustments may be made in ≥4-wk intervals; those taking verapamil and amiodarone max 20 mg/day; max <80 mg for Chinese patients taking lipid-modifying niacin doses
- **Child/adolescent ≥10 yr including girls ≥1 yr postmenarche: PO** 10 mg in PM, range 10-40 mg/day

With diltiazem/verapamil/dronedarone
- **Adult: PO** 5-10 mg in PM, max 10 mg/day

With amiodarone, amoLODIPine, ranolazine
- **Adult: PO** 5-20 mg daily in evening, max 20 mg/day

Heterozygous familial hypercholesterolemia
- **Adolescent 10-17 yr: PO** 10 mg/day, max 40 mg/day

Available forms: Tabs 5, 10, 20, 40, 80 mg

Administer:
- Total daily dose in evening

SIDE EFFECTS

CNS: Headache, cognitive impairment
GI: Nausea, constipation, diarrhea, dyspepsia, flatus, abdominal pain, liver dysfunction, pancreatitis, hyperglycemia
INTEG: Rash, pruritus
MS: Muscle cramps, myalgia, myositis, rhabdomyolysis, myopathy
RESP: Upper respiratory tract infection

PHARMACOKINETICS

Metabolized in liver (active metabolites); >98% protein bound; excreted primarily in bile, feces (60%), kidneys (15%); peak 1-2 hr; half-life 3 hr

INTERACTIONS

⚠ Do not use with cycloSPORINE, gemfibrozil

⚠ Increase: effects of warfarin

⚠ Increase: rhabdomyolysis, myalgia; do not use concurrently—niacin, erythromycin, clofibrate, clarithromycin, keto-

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conazole, itraconazole, protease inhibitors, macrolide antibiotics, danazol, delavirdine, nefazodone, verapamil, diltiazem, amiodarone, azole antifungals, telithromycin, voriconazole
Increase: serum level of digoxin
Drug/Herb
Increase: effect—red yeast, rice
Decrease: effect—St. John's wort
Drug/Lab Test
Increase: CK, LFTs

NURSING CONSIDERATIONS

Assess:
• Diet history: fat consumption; baseline and lipid profile: LDL, HDL, TG, cholesterol
• Hepatic studies at baseline, after 4-6 wk, periodically thereafter; AST, ALT, may increase
⚠ **Rhabdomyolysis:** muscle tenderness, increased CPK levels (10× above upper normal limit); therapy should be discontinued, more likely in those receiving >80 mg/day, first year of treatment, those ≥65 yr, females
• Renal studies in patients with compromised renal systems: BUN, I&O ratio, creatinine
Perform/provide:
• Storage in cool environment in tight container protected from light
Evaluate:
• Therapeutic response: decrease in LDL, total cholesterol, triglycerides; increase in HDL; slowing CAD
Teach patient/family:
• That blood work will be necessary during treatment
• To report severe GI symptoms, headache
• That previously prescribed regimen will continue: low-cholesterol diet, exercise program
• To notify prescriber if pregnancy is suspected or planned; pregnancy (X); not to breastfeed

sirolimus (Rx)

(seer-oh-lie'mus)
Rapamune
Func. class.: Immunosuppressant
Chem. class.: Macrolide

ACTION: Produces immunosuppression by inhibiting T-lymphocyte activation and proliferation

USES: Organ transplants to prevent rejection; recommended use is with cycloSPORINE and corticosteroids

CONTRAINDICATIONS: Breastfeeding, hypersensitivity to this product, components of product
Precautions: Pregnancy (C), children <13 yr, severe cardiac/renal/hepatic disease; diabetes mellitus, hyperkalemia, hyperuricemia, hypertension, interstitial lung disease, hyperlipidemia
Black Box Warning: Lymphomas, infection, other malignancies

DOSAGE AND ROUTES

• **Adult/adolescent ≥40 kg: PO** 2 mg/day with 6 mg loading dose
• **Child >13 yr weighing <40 kg (88 lb): PO** 1 mg/m²/day, 3 mg/m² loading dose
Hepatic dose
• **Adult/child ≥13 yr/<40 kg: PO** reduce by 33% for maintenance dose (mild to moderate hepatic impairment); reduce by 50% for maintenance dose (severe hepatic impairment)
Available forms: Oral sol 1 mg/ml; tabs 0.5 mg, 1 mg, 2 mg
Administer:
• Prophylaxis for *Pneumocystis jiroveci* pneumonia for 1 yr after transplantation; prophylaxis for CMV is recommended for 90 days after transplantation in those at increased risk for CMV
• All medications PO if possible, avoid IM inj; bleeding may occur

• For 3 days before transplant surgery; patients should be placed in protective isolation; give at same time of day, give 4 hr after cycloSPORINE oral sol or caps; do not give with grapefruit juice
• Use amber oral dose syringe and withdraw amount of oral sol needed from bottle, empty correct dose into plastic/glass container holding 60 ml of water/orange juice, stir vigorously and have patient drink at once, refill container with additional 120 ml water/orange juice, stir vigorously and have patient drink at once; if using a pouch, squeeze entire contents into container, follow above directions
• Store protected from light, refrigerate; stable for 30 days after opening (sol)
• Do not crush, chew; store tabs at room temp

SIDE EFFECTS

CNS: *Tremors, headache, insomnia, paresthesia,* chills, fever
CV: Hypertension, *atrial fibrillation, CHF, hypotension, palpitation, tachycardia,* peripheral edema, thrombosis
EENT: Blurred vision, photophobia
GI: Nausea, vomiting, diarrhea, constipation, hepatotoxicity
GU: UTIs, albuminuria, hematuria, proteinuria, renal failure, nephrotic syndrome, increased creatinine
HEMA: Anemia, leukopenia, thrombocytopenia, purpura, pancytopenia
INTEG: *Rash, acne,* photosensitivity
META: Hyperglycemia, increased creatinine, edema, hypercholesterolemia, *hyperlipemia,* hypophosphatemia, weight gain, hypo/hyperkalemia, hyperuricemia, hypomagnesemia, hypertriglyceridemia
MS: Arthralgia
RESP: Pleural effusion, atelectasis, *dyspnea,* pneumonitis, pulmonary embolism/fibrosis
SYST: Lymphoma, exfoliative dermatitis

PHARMACOKINETICS

Rapidly absorbed; peak 1 hr single dose, 2 hr multiple dosing; protein binding 92%; extensively metabolized by CYP3A4 enzyme system, half-life 57-63 hr

INTERACTIONS

⚠ Increase: angioedema—ACE inhibitors, angiotensin-II–receptor antagonists, cephalosporins, iodine-containing radiopaque contrast media, neuromuscular blockers, NSAIDs, penicillins, salicylates, thrombolytics
Increase: blood levels—antifungals, calcium channel blockers, cimetidine, danazol, erythromycin, cycloSPORINE, metoclopramide, bromocriptine, HIV-protease inhibitors
Decrease: blood levels—carBAMazepine, PHENobarbital, phenytoin, rifamycin, rifapentine
Decrease: effect of vaccines

Drug/Herb
• St. John's wort: may decrease the effect of sirolimus

Drug/Food
• Alters bioavailability; use consistently with/without food; do not use with grapefruit juice

Drug/Lab Test
Increase: LFTs, alk phos, lipids, triglycerides, total cholesterol, BUN, creatinine, LDH, phosphate
Decrease: platelets, sodium
Increase or decrease: magnesium, glucose, calcium

NURSING CONSIDERATIONS

Assess:
• Blood levels in patients who may have altered metabolism, trough level ≥15 ng/ml are associated with increased adverse reactions; monitor trough concentrations in all patients
• Creatinine/BUN, CBC, serum potassium
• **Lipid profile:** cholesterol, triglycerides; lipid-lowering agent may be needed

Black Box Warning: Infection and development of lymphoma; only those experienced in immunosuppressant therapy and organ transplantation should use this product; use only in renal transplant

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• **High risk:** those with Baniff grade 3 acute rejection or vascular rejection before cycloSPORINE withdrawal, dialysis dependent, creatinine >4.5 mg/dl, African American patient, re-transplants, multiorgan transplant, high panel of reactive antibodies

• **Pulmonary fibrosis, pulmonary effusion, pneumonitis:** dyspnea, cough, hypoxia; some fatal cases have occurred

• **Wound dehiscence and anastomotic disruption:** wound, vascular, airway, ureteral, biliary, inhibition of growth factors; do not combine with corticosteroids

• **Anaphylaxis, angioedema, exfoliative dermatitis:** more common when given with ACE inhibitors; do not use if a hypersensitivity reaction occurs

⚠ **Bone marrow suppression:** Hgb, WBC, platelets during treatment each mo; if leukocytes <3000/mm³ or platelets <100,000/mm³, product should be discontinued or reduced; decreased hemoglobin level

⚠ **Hepatotoxicity:** alk phos, AST, ALT, amylase, bilirubin, dark urine, jaundice, itching, light-colored stools; product should be discontinued

Evaluate:

• Therapeutic response: absence of graft rejection; immunosuppression with autoimmune disorders

Teach patient/family:

⚠ To report fever, rash, severe diarrhea, chills, sore throat, fatigue; serious infections may occur; clay-colored stools, cramping **(hepatotoxicity)**

• To avoid crowds, persons with known infections to reduce risk for infection

• To use contraception before, during, for 12 wk after product discontinued; to avoid breastfeeding

• To use sunscreen, protective clothing to prevent burns, skin cancer

• Not to use with grapefruit juice

• To avoid vaccines

• That lifelong use will be required to prevent rejection

• That continuing follow-up exams and blood work will be required

• Not to get on skin

• How to use product

• To take with or without regard to food, at same time, consistently

• Take 4 hr after cycloSPORINE

sitaGLIPtin (Rx)

(sit-a-glip'tin)

Januvia

Func. class.: Antidiabetic, oral

Chem. class.: Dipeptidyl-peptidase-4 inhibitor (DPP-4 inhibitor)

ACTION: Slows the inactivation of incretin hormones; improves glucose homeostasis, improves glucose-dependent insulin secretion, lowers glucagon secretions, and slows gastric emptying time

USES: Type 2 diabetes mellitus as monotherapy or in combination with other antidiabetic agents

CONTRAINDICATIONS: Hypersensitivity, diabetic ketoacidosis (DKA)

Precautions: Pregnancy (B), geriatric patients, GI obstruction, surgery, thyroid/renal/hepatic disease, trauma, breastfeeding, pancreatitis, hypercortisolism, hyperglycemia, hyperthyroidism, hypoglycemia, ileus, pituitary insufficiency, surgery, type 1 diabetes mellitus, diabetic ketoacidosis

DOSAGE AND ROUTES

• **Adult: PO** 100 mg/day; may use with antidiabetic agents other than insulin

Renal dose

• **Adult: PO** CCr 30-50 ml/min, 50 mg daily; CCr <30 ml/min, 25 mg daily

Available forms: Tabs 25, 50, 100 mg

Administer:

• May be taken with/without food

• Do not split, crush, chew; swallow whole

SIDE EFFECTS

CNS: *Headache*
ENDO: Hypoglycemia
GI: *Nausea, vomiting,* abdominal pain, diarrhea, pancreatitis, constipation
MISC: *Peripheral edema*
SYST: Anaphylaxis, Stevens-Johnson syndrome, angioedema

PHARMACOKINETICS

Rapidly absorbed, excreted by the kidneys (unchanged 79%), terminal half-life 12.4 hr, peak 1-4 hr

INTERACTIONS

Increase: sitaGLIPtin level—cimetidine, disopyramide
Increase: levels of digoxin
Increase: hypoglycemia—androgens, insulins, β-blockers, cimetidine, corticosteroids, salicylates, MAOIs, fibric acid derivatives, FLUoxetine, sulfonylureas
Decrease: antidiabetic effect—thiazide diuretics, ACE inhibitors, protease inhibitors, sympathomimetics, ARIPiprazole, cloZAPine, OLANZapine, QUEtiapine, risperiDONE, ziprasidone, phenytoin, fosphenytoin, phenothiazines, estrogens, progestins, oral contraceptives
Drug/Herb
Increase: antidiabetic effect—garlic, green tea, horse chestnut
Drug/Lab Test
Increase: creatinine, LFTs

NURSING CONSIDERATIONS

Assess:
• **Hypoglycemic reactions:** sweating, weakness, dizziness, anxiety, tremors, hunger; hyperglycemic reactions soon after meals
⚠ **Serious skin reactions:** swelling of face, mouth, lips, dyspnea, wheezing
⚠ **Pancreatitis:** severe abdominal pain, nausea, vomiting; discontinue product
• **Renal studies:** BUN, creatinine during treatment, especially in geriatric patients or those with renal disease
• Glycosylated hemoglobin A1c; monitor blood glucose (BG) as needed

Perform/provide:
• Conversion from other antidiabetic agents; change may be made with gradual dosage change
• Storage in tight container at room temp
Evaluate:
• Therapeutic response: decrease in polyuria, polydipsia, polyphagia; clear sensorium; absence of dizziness; stable gait, blood glucose, A1c improvement
Teach patient/family:
• To perform regular self-monitoring of blood glucose using blood-glucose meter
• About the symptoms of hypo/hyperglycemia, what to do about each; to carry emergency ID
• To notify prescriber if pregnancy is planned, suspected
• That product must be continued on daily basis; about consequences of discontinuing product abruptly; to continue health regimen (diet, exercise)
• To avoid OTC medications, alcohol, digoxin, exenatide, insulins, nateglinide, repaglinide, and other products that lower blood glucose unless approved by prescriber
• That diabetes is a lifelong illness; that product is not a cure, only controls symptoms
• That all food included in diet plan must be eaten to prevent hypo/hyperglycemia
• To immediately notify prescriber of hypersensitivity reactions (rash, swelling of face, trouble breathing)

S

sodium bicarbonate (Rx, OTC)

Baking soda, Neut, Sellymin ✤
Func. class.: Alkalinizer
Chem. class.: $NaHCO_3$

ACTION: Orally neutralizes gastric acid, which forms water, NaCl, CO_2; increases plasma bicarbonate, which buf-

fers H^+ ion concentration; reverses acidosis IV

USES: Acidosis (metabolic), cardiac arrest, alkalinization (systemic/urinary) antacid, salicylate poisoning
Unlabeled uses: Contrast media nephrotoxicity prevention

CONTRAINDICATIONS: Metabolic/respiratory alkalosis, hypochloremia, hypocalcemia
Precautions: Pregnancy (C), children, CHF, cirrhosis, toxemia, renal disease, hypertension, hypokalemia, breastfeeding, hypernatremia, Bartter's syndrome, Cushing's syndrome, hyperaldosteronism

DOSAGE AND ROUTES

Acidosis, metabolic (not associated with cardiac arrest)
• **Adult and child: IV INF** 2-5 mEq/kg over 4-8 hr depending on CO_2, pH, ABGs
Cardiac arrest
• **Adult and child: IV BOL** 1 mEq/kg of 7.5% or 8.4% sol, then 0.5 mEq/kg q10min, then doses based on ABGs
• **Infant: IV** 1 mEq/kg over several min (use only the 0.5 mEq/ml [4.2%] sol for inj)
Alkalinization of urine
• **Adult: PO** 325 mg to 2 g qid or 48 mEq (4 g) then 12-24 mEq q4hr
• **Child: PO** 84-840 mg/kg/day (1-10 mEq/kg) in divided doses q4-6hr
Antacid
• **Adult: PO** 300 mg to 2 g chewed, taken with water daily-qid
Available forms: Tabs 300, 325, 600, 650 mg; inj 4.2%, 5%, 7.5%, 8.4%
Administer:
PO route
• Chew antacid tablets and drink 8 oz water
• Do not take antacid with milk because milk-alkali syndrome may result
Direct IV route
• Use for cardiac emergencies, not used often in cardiac arrest
• Use ampules or prefilled syringes only; give by rapid bolus dose; flush with NS before, after use
Continuous IV INF route
• Diluted in an equal amount of compatible sol given 2-5 mEq/kg over 4-8 hr, max 50 mEq/hr; slower rate in children
• Extravasation with IV administration (tissue sloughing, ulceration, necrosis)

Y-site compatibilities: Acyclovir, amifostine, asparaginase, aztreonam, bivalirudin, bumetanide, ceFAZolin, cefepime, cefTAZidime, ceftizoxime, cefTRIAXone, chloramphenicol, cimetidine, cladribine, clindamycin, cyclophosphamide, cycloSPORINE, cytarabine, DAPTOmycin, DAUNOrubicin, dexamethasone sodium phosphated exmedetomidine, digoxin, DOCEtaxel, DOXOrubicin, enalaprilat, ertapenem, erythromycin, esmolol, etoposide, etoposide phosphate, famotidine, fentaNYL, filgrastim, fluconazole, fludarabine, furosemide, gallium nitrate, gemcitabine, gentamicin, granisetron, heparin, hydrocortisone sodium succinate, ifosfamide, indomethacin, insulin, ketorolac, labetalol, levofloxacin, lidocaine, linezolid, LORazepam, magnesium sulfate, melphalan, mesna, meperidine, methylPREDNISolone sodium succinate, metoclopramide, metoprolol, metroNIDAZOLE, milrinone, morphine, nafcillin, nitroglycerin, nitroprusside, PACLitaxel, palonosetron, pantoprazole, PEMEtrexed, penicillin G potassium, phenylephrine, phytonadione, piperacillin/tazobactam, potassium chloride, procainamide, propranolol, propofol, protamine, ranitidine, remifentanil, tacrolimus, teniposide, thiotepa, ticarcillin/clavulanate, tirofiban, tobramycin, tolazoline, vasopressin, vit B complex with C, voriconazole

SIDE EFFECTS

CNS: Irritability, headache, confusion, stimulation, tremors, *twitching, hyperreflexia,* tetany, weakness, seizures of alkalosis

CV: Irregular pulse, cardiac arrest, water retention, edema, weight gain
GI: Flatulence, *belching, distention*
META: *Metabolic alkalosis*
MS: Muscular twitching, tetany, irritability

PHARMACOKINETICS

PO: Onset rapid, duration 10 min
IV: Onset 15 min, duration 1-2 hr, excreted in urine

INTERACTIONS

Increase: effects—amphetamines, mecamylamine, quiNINE, quiNIDine, pseudoephedrine, flecainide, anorexiants, sympathomimetics
Increase: sodium and decrease potassium—corticosteroids
Decrease: effects—lithium, chlorpropAMIDE, barbiturates, salicylates, benzodiazepines, ketoconazole, corticosteroids
Drug/Lab Test
Increase: sodium, lactate
Decrease: potassium

NURSING CONSIDERATIONS

Assess:
• Respiratory and pulse rate, rhythm, depth, lung sounds; notify prescriber of abnormalities
• **Fluid balance** (I&O, weight daily, edema); notify prescriber of fluid overload; assess for edema, crackles, shortness of breath
• Electrolytes, blood pH, PO_2, HCO_3^-, during treatment; ABGs frequently during emergencies
• Weight daily with initial therapy
• **Alkalosis:** irritability, confusion, twitching, hyperreflexia stimulation, slow respirations, cyanosis, irregular pulse
• **Milk-alkali syndrome:** confusion, headache, nausea, vomiting, anorexia, urinary stones, hypercalcemia
• For GI perforation secondary to carbon dioxide in GI tract; may lead to perforation if ulcer is severe enough

Evaluate:
• Therapeutic response: ABGs, electrolytes, blood pH, HCO_3^- WNL
Teach patient/family:
• Not to take antacid with milk because milk-alkali syndrome may result; not to use antacid for >2 wk
⚠ To notify prescriber if indigestion accompanied by chest pain; trouble breathing; diarrhea; dark, tarry stools; vomit that looks like coffee grounds; swelling of feet/ankles
• About sodium-restricted diet; to avoid use of baking soda for indigestion

sodium polystyrene sulfonate (Rx)

(po-lee-stye'reen)
Kayexalate, Kionex, SPS
Func. class.: Potassium-removing resin
Chem. class.: Cation exchange resin

ACTION: Removes potassium by exchanging sodium for potassium in body, primarily in large intestine

USES: Hyperkalemia in conjunction with other measures

CONTRAINDICATIONS: Hypersensitivity to saccharin or parabens that may be in some products, GI obstruction, neonate (reduced gut motility)
Precautions: Pregnancy (C), geriatric patients, renal failure, CHF, severe edema, severe hypertension, sodium restriction, constipation, GI bleeding, hypocalcemia

DOSAGE AND ROUTES

• **Adult: PO** 15 g daily-qid; **RECT** enema 30-50 g q1-2hr initially prn then q6hr prn
• **Child (unlabeled): PO** 1 g/kg q6hr prn; **RECT** 1 g/kg q2-6hr prn
Available forms: Powder for susp 453.6 g, 454 g; oral susp 15 g/60 ml

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Administer:

PO route

• **Powdered resin:** Each dose of the powdered resin is usually given orally as a suspension in water or in a syrup; usually, the amount of fluid ranges from 20 to 100 ml, depending on the dosage, or 3–4 ml/g of resin; suspensions should be freshly prepared and not stored for >24 hr; the suspension may be also be introduced into the stomach via a tube, or the powdered resin may be mixed with the patient's food; the powder should not be mixed with foods or liquids that contain a large amount of potassium (bananas or orange juice)

Rectal route

• Precede retention enema with a cleansing enema

• Instruct patient to lie down on left side with lower leg extended and the upper leg flexed for support, or place the patient in the knee–chest position; gently insert a soft, large (28 Fr) rubber tube into the rectum for a distance of about 20 cm; the tip should be well into the sigmoid colon; tape the tube in place; suspend the sodium polystyrene sulfonate powdered resin in 100 ml of an aqueous vehicle (water or sorbitol) that has been warmed to body temperature and introduce through the tube by gravity; the particles should be kept suspended by stirring the suspension during administration; alternatively, 120–180 ml of a commercially available suspension may be administered as a retention enema after the suspension has been warmed to body temperature; following administration, flush the tube with 50–100 ml of fluid and clamp the tube and leave in place; the suspension should be retained in the colon for at least 30–60 min or for several hours, if possible

• After several hours have passed, administer a cleansing enema using a non–sodium-containing solution at body temperature; up to 2 quarts of fluid may be necessary; drain fluid through a Y-tube connection; observe the drainage if sorbitol was used

SIDE EFFECTS

GI: Constipation, anorexia, nausea, vomiting, diarrhea (sorbitol), fecal impaction, gastric irritation

META: Hypocalcemia, hypokalemia, hypomagnesemia, sodium retention

INTERACTIONS

Increase: hypokalemia—loop diuretics, cardiac glycosides

Increase: metabolic alkalosis—magnesium/calcium antacids

Increase: colonic necrosis—sorbitol; do not use concurrently

Decrease: effect of—lithium, thyroid hormones

NURSING CONSIDERATIONS

Assess:

• **Hyperkalemia:** confusion, dyspnea, weakness, dysrhythmias; ECG for spiked T waves, depressed ST segments, prolonged QT and widening QRS complex

• Bowel function daily; note consistency of stools, times/day

• **Hypotension:** confusion, irritability, muscular pain, weakness

• **Electrolytes:** serum potassium, calcium, magnesium, sodium; acid-base balance

• I&O ratio, weight daily; crackles, dyspnea, jugular venous distension, edema

• **Digoxin toxicity** (nausea, vomiting, blurred vision, anorexia, dysrhythmias) in those receiving digoxin

Perform/provide:

• Storage of freshly prepared sol 24 hr at room temp

Evaluate:

• Therapeutic response: potassium level 3.5-5 mg/dl

Teach patient/family:

• About reason for medication and expected results

• To follow a low potassium diet, provide sample diet

• To avoid laxatives, antacids, electrolyte-based products unless approved by prescriber

solifenacin (Rx)

(sol-i-fen'a-sin)

VESIcare

Func. class.: Urinary antispasmodic, anticholinergic

Chem. class.: Anti-muscarinic

ACTION: Relaxes smooth muscles in urinary tract by inhibiting acetylcholine at postganglionic sites

USES: Overactive bladder (urinary frequency, urgency, incontinence)

CONTRAINDICATIONS: Hypersensitivity, uncontrolled closed-angle glaucoma, urinary retention, gastric retention

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, renal/hepatic disease, controlled closed-angle glaucoma, bladder outflow obstruction, GI obstruction, decreased GI motility, history of QT prolongation

DOSAGE AND ROUTES

- **Adult: PO** 5 mg/day, max 10 mg/day

Renal/hepatic dose

- **Adult: PO** (Child-Pugh B) max 5 mg/day; CCr ≤30 ml/min, 5 mg/day

Available forms: Tabs 5, 10 mg

Administer:

PO route

- Without regard to meals
- Swallow product whole with water, liquid

SIDE EFFECTS

CNS: Anxiety, paresthesia, fatigue, *dizziness,* headache, confusion

CV: Chest pain, hypertension, QTc prolongation, peripheral edema

EENT: *Vision abnormalities, xerophthalmia,* nasal dryness

GI: *Nausea, vomiting, anorexia,* abdominal pain, *constipation, dry mouth,* dyspepsia

GU: Dysuria, urinary retention, frequency, UTI

INTEG: Rash, pruritus, angioedema, exfoliative dermatitis, erythema multiforme

MISC: Hyperthermia

RESP: Bronchitis, cough, pharyngitis, upper respiratory tract infection

PHARMACOKINETICS

90% absorbed; 98% protein bound; extensively metabolized by CYP3A4; excreted in urine 69% (metabolites), feces 22%; terminal half-life 45-68 hr

INTERACTIONS

Increase: QT prolongation—Class IA, III antidysrhythmias

Increase: CNS depression—sedatives, hypnotics, benzodiazepines, opioids

Increase: effects—CYP3A4 inhibitors (ketoconazole, clarithromycin, diclofenac, doxycycline, erythromycin, isoniazid, nefazodone, propofol, protease inhibitors, verapamil), max dose 5 mg

Decrease: effects—CYP3A4 inducers (carBAMazepine, nevirapine, PHENobarbital, phenytoin)

Drug/Herb

Decrease: effects—St. John's wort

Drug/Food

Increase: effect—grapefruit juice

NURSING CONSIDERATIONS

Assess:

- **Urinary patterns:** distention, nocturia, frequency, urgency, incontinence
- **Allergic reactions:** rash
- **Angioedema:** of the face, lips, tongue, larynx

⚠ Cardiac patients: monitor ECG for QTc prolongation; avoid products that increase QT prolongation

Evaluate:

- Decreasing dysuria, frequency, nocturia, incontinence

Teach patient/family:

- To avoid hazardous activities because dizziness may occur

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- That constipation, blurred vision may occur, to notify prescriber if abdominal pain with constipation occurs
- To take without regard to food
- To swallow tab whole, do not split, crush, chew
- To call prescriber if severe abdominal pain or constipation lasts for ≥3 days
- That heat prostration may occur if used in hot environment, sweating is decreased
- About **anticholinergic effects:** blurred vision, constipation, urinary retention, hyperthermia

somatropin (Rx)

(soe-ma-troe'pin)

Genotropin, Humatrope, Norditropin, Norditropin Flexpro, Nutropin, Nutropin AQ, Omnitrope, Saizen, Serostim, Tev-Tropin, Zorbtive

Func. class.: Pituitary hormone

Chem. class.: Growth hormone

Do not confuse:
somatropin/SUMAtriptan/somatrem

ACTION: Stimulates growth; somatropin is similar to natural growth hormone; both preparations were developed with the use of recombinant DNA

USES: Pituitary growth hormone deficiency (hypopituitary dwarfism), children with human growth hormone deficiency/growth failure, AIDS wasting syndrome, cachexia, adults with somatropin deficiency syndrome (SDS), short stature in Noonan syndrome, SHOX deficiency, Turner's syndrome, Prader-Willi syndrome

CONTRAINDICATIONS: Hypersensitivity to benzyl alcohol, creosol; closed epiphyses, intracranial lesions, acute respiratory failure, Prader-Willi syndrome with obesity, trauma

Precautions: Pregnancy (C), breastfeeding, newborn, geriatric patients, diabetes mellitus, hypothyroidism, prolonged treatment in adults, scoliosis, sleep apnea, chemotherapy, respiratory disease, glycerin hypersensitivity (with formulations that contain these products)

DOSAGE AND ROUTES

Genotropin

- **Child: SUBCUT** 0.16-0.24 mg/kg/wk divided into 6 or 7 daily inj, give in abdomen, thigh, buttocks
- **Adult: SUBCUT** 0.04-0.08 mg/kg/wk divided into 6-7 daily doses

Humatrope

- **Adult: IM** 0.006 international units/kg/day, max 0.0125 units/kg/day
- **Child: SUBCUT/IM** 0.18 mg/kg divided into equal doses either on 3 alternate days or 6×/wk, max weekly dose 0.3 mg/kg

Nutropin/Nutropin AQ (growth hormone deficiency)

- **Child: SUBCUT** 0.3 mg/kg/wk

Serostim

- **Adult: SUBCUT** at bedtime >55 kg, 6 mg; 45-55 kg, 5 mg; 35-45 kg, 4 mg

Norditropin

- **Child: SUBCUT** 0.024-0.034 mg/kg 6-7×/wk

Accretropin

- **Child: SUBCUT** 0.18-0.3 mg/kg/wk divided into 6 or 7 equal daily inj

Replacement of GH in GH deficiency

- **Adult: SUBCUT** (Saizen) 0.005 mg/kg/day; may increase after 4 wk to max 0.01 mg/kg/day

Available forms: Powder for inj (lyophilized) 1.5 mg (4 international units/ml), 4 mg (12 international units/vial), 5 mg (13 international units/vial), 5 mg (15 international units/vial) rDNA origin, 5.8 mg (15 international units/ml), 6 mg (18 international units/ml), 8 mg (24 international units/vial), 10 mg (26 international units/vial); inj 10 mg (30 international units/vial), 5 mg/1.5 ml, 10 mg/1.5 ml, 15 mg/1.5 ml

Administer:
• Give IM or subcut, do not use IV
• Discontinue therapy if final height is achieved or epiphyseal fusion occurs
• Visually inspect parenteral products for particulate matter and discoloration

Reconstitution and storage

Accretropin:
• No reconstitution needed; before use, swirl the contents of the vial with a gentle rotary motion, do not shake; the solution should be clear
• Store unopened vials refrigerated, do not freeze, protect from light; once opened, the vial may be stored refrigerated ≤14 days

Genotropin:
• This product is supplied as a powder, filled in a two-chamber cartridge with the active substance in the front chamber and the diluent in the rear chamber; the product is available in a 5-mg cartridge (green tip) and a 12-mg cartridge (purple tip); the 5- and 12-mg cartridges may be used with the Genotropin Pen or the Genotropin Mixer; genotropin is also available, in various doses ranging from 0.2 mg to 2 mg, in single use, auto-mix devices called Genotropin Miniquicks
• **Cartridges:** Store cartridges refrigerated before reconstitution, do not freeze; protect from light; a reconstitution device supplied by the manufacturer is used to mix the powder and the diluent; after the powder and diluent are mixed, gently tip the cartridge upside down a few times until powder is completely dissolved; *do not shake;* this can cause denaturation of the protein; if the solution is cloudy, do not use; following reconstitution, the 5-mg cartridge contains a 5 mg/ml solution and the 12 mg cartridge contains a 12 mg/ml solution; the 5-mg and 12-mg cartridges contain overfill; the cartridges contain diluent with preservative (m-cresol) and may be stored refrigerated ≤28 days after reconstitution; do not use the 5-mg and 12-mg cartridges in patients with m-cresol hypersensitivity
• **Genotropin Minquicks:** After dispensing but before reconstitution, store at ≤77 degrees ≤3 months; a reconstitution device supplied by the manufacturer is used to mix the powder and diluent; ten different strengths are available that each deliver a fixed volume of 0.25 ml; this product contains a diluent with no preservative, refrigerate after reconstitution and use within 24 hr; use the reconstituted solution only once and discard any remaining solution

Humatrope:
• Before reconstitution, store refrigerated
• **Vials:** Reconstitute each 5-mg vial with 1.5–5 ml of the supplied diluent (contains m-cresol as a preservative) or bacteriostatic water for injection (contains benzoyl alcohol as a preservative); sterile water for injection may be used for patients with a hypersensitivity to m-cresol and benzoyl alcohol; direct the liquid against the glass vial wall; swirl vial with a gentle rotary motion until contents are dissolved completely; do not shake; if the solution is cloudy, do not use; small, colorless particles may be present after refrigeration, this is not unusual for solutions containing proteins; vials reconstituted with the diluent or bacteriostatic water are stable for 14 days when stored refrigerated; for vials reconstituted with sterile water, use the vial only once and discard the unused portion; if not used immediately, refrigerate and use within 24 hr; avoid freezing reconstituted solutions
• **Cartridges:** Reconstitute cartridges using *only* the supplied diluent syringe; the cartridges are designed for use only with the Humatrope injection device; once reconstituted, the cartridges are stable for up to 28 days when stored refrigerated; store the injection device without the needle attached; avoid freezing reconstituted solutions

Norditropin:
• Do not use reconstituted solution if it is cloudy or contains particulate matter
• Before use, store refrigerated
• Reconstitution of the cartridges is not required; the cartridge is intended for

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use only with the NordiPen injector; a prefilled, disposable pen, NordiFlex Pen injector, is also available; each cartridge size (5 mg, 10 mg, or 15 mg per 1.5-ml cartridge) has a color-coded corresponding pen, which is graduated to deliver an appropriate dose based on the solution's concentration; NordiPen and NordiFlex Pen allow administration of a minimum 0.25-mg dose to a maximum 4.5-mg dose, depending on cartridge concentrations; follow directions provided in NordiPen injector instruction booklet

• After a cartridge has been inserted into the NordiPen injector or once a NordiFlex pen is in use, the pen should be stored refrigerated and used within 4 wk; alternatively, the 5-mg and 10-mg cartridges may be stored in the pen at room temperature, no higher than 77 degrees, for up to 3 wk; NovoFine needles are recommended for administration; wipe the stopper of the pen cartridge with rubbing alcohol

Nutropin:

• Before reconstitution, store refrigerated

• Reconstitute each 5-mg vial with 1–5 ml bacteriostatic water for injection (benzyl alcohol preserved) and each 10-mg vial with 1–10 ml of bacteriostatic water for injection (benzyl alcohol preserved); if using for newborns, reconstitute with sterile water for injection; direct the liquid against the glass vial wall; swirl vial with a gentle rotary motion until contents are dissolved completely; do not shake; if the solution is cloudy after reconstitution or refrigeration, do not use; small, colorless particles may be present after refrigeration, this is not unusual for solutions containing proteins

• Solutions reconstituted with bacteriostatic water for injection are stable for 14 days refrigerated

• Solutions reconstituted with sterile water for injection should be used immediately and only once; discard any unused portions; avoid freezing reconstituted solutions

Nutropin AQ:

• Does not require reconstitution; solution should be clear; small, colorless particles may be present after refrigeration, this is not unusual for solutions containing proteins; allow vial or pen cartridge to come to room temperature, and gently swirl; if solution is cloudy, do not use

• **Vials:** Before inserting needle, wipe the vial septum with rubbing alcohol or antiseptic solution to prevent contamination by microorganisms that may be introduced by repeated needle insertions; administer using sterile disposable syringes and needles; use syringes with small enough volume that the prescribed dose may be drawn from the vial with reasonable accuracy

• **Pen cartridge:** Two strengths are available, 10 mg and 20 mg; intended for use only with Nutropin AQ Pen; each pen and cartridge are color coded to ensure accurate placement of the 10-mg or 20-mg cartridge into the appropriate pen; do not use the 20-mg cartridge in the pen intended for the 10-mg cartridge, and vice versa; wipe septum of pen cartridge with rubbing alcohol or antiseptic solution to prevent contamination by microorganisms that may be introduced by repeated needle insertions; administer using sterile, disposable needles; follow the directions provided in the Nutropin AQ Pen Instructions for Use; the Nutropin AQ 10 pen allows administration of a minimum 0.1-mg dose to a maximum 4-mg dose, in 0.1-mg increments; the Nutropin AQ 20 pen allows administration of a minimum 0.2-mg dose to a maximum 8-mg dose, in 0.2-mg increments

• **Prefilled device:** A prefilled multidose, dial-a-dose device is available in 3 strengths; administer using disposable needles; follow the directions provided in the Nutropin AQ NuSpin Instructions for Use; the Nutropin AQ Nuspin 5 allows administration of a minimum dose of 0.05 mg to a maximum dose of 1.75 mg, in increments of 0.05 mg; the Nutropin

AQ Nuspin 10 allows administration of a minimum dose of 0.1 mg to a maximum dose of 3.5 mg, in increments of 0.1 mg; the Nutropin AQ Nuspin 20 allows administration of a minimum dose of 0.2 mg to a maximum dose of 7 mg, in increments of 0.2 mg

• After initial use, vials, cartridges, and prefilled devices are stable for 28 days refrigerated; avoid freezing; vials, cartridges, and prefilled devices are light sensitive; protect from light

Omnitrope:

• Before reconstitution, store vials refrigerated; store in the carton; Omnitrope is sensitive to light

• **Vials:** Reconstitute the vial with diluent provided using a sterile disposable syringe; swirl the vial gently, but do not shake; if the solution is cloudy after reconstitution, the contents must not be injected; after reconstitution, the 1.5-mg vial may be refrigerated ≤24 hr; the 1.5-mg vial does not contain a preservative and should only be used once; discard any remaining solution; the 5.8-mg vial diluent contains benzoyl alcohol as a preservative; after reconstitution, the contents must be used within 3 wk; after the first injection, store the 5.8-mg vial in the carton, to protect from light, in the refrigerator; avoid freezing

• **Omnitrope Pen 5 cartridge:** Each 5-mg cartridge must be inserted into the Omnitrope Pen 5 delivery system; follow the directions provided in the Omnitrope Instructions for Use; the cartridge contains benzoyl alcohol as a preservative; after the first use, store refrigerated ≤28 days; protect from light, avoid freezing

• **Omnitrope Pen 10 cartridge:** Each 10-mg cartridge must be inserted into the Omnitrope Pen 10 delivery system; follow the directions provided in the Omnitrope Instructions for Use; after the first use, store refrigerated ≤28 days; protect from light, avoid freezing

Saizen:

• Before reconstitution, store at room temperature

• **Vials:** Reconstitute each 5-mg vial with 1–3 ml bacteriostatic water for injection; reconstitute each 8.8-mg vial with 2–3 ml bacteriostatic water for injection (benzoyl alcohol preserved); in patients with hypersensitivity to benzyl alcohol, the vials may be mixed with sterile water for injection; Direct the liquid against the glass vial wall; swirl vial with a gentle rotary motion until contents are dissolved completely; do not shake; the solution should be clear; if it is cloudy immediately after reconstitution or refrigeration, do not use; small colorless particles may be present after refrigeration, this is not unusual for solutions containing proteins; after reconstitution, store vials mixed with bacteriostatic water for injection refrigerated and use within 14 days; for vials mixed with sterile water for injection, the solution should be used immediately, and any unused portion should be discarded; avoid freezing

• **Cartridges:** Available in 4 mg and 8.8 mg click.easy cartridges for use in a compatible injection device; a reconstitution device supplied by the manufacturer is used to mix the Saizen with accompanying diluent containing metacresol; cartridges reconstituted with the diluent containing metascresol are stable under refrigeration for ≤21 days; avoid freezing

Serostim:

• Before reconstitution, store vials and diluent at room temperature (15–30 degrees C; 59–86 degrees F)

• **Vials:** Reconstitute the 5-mg or 6-mg vials with 0.5–1 ml of supplied diluent (sterile water for injection); reconstitute the 4-mg vial with 0.5–1 ml of bacteriostatic water for injection (benzoyl alcohol preserved) and the 8.8-mg vial with 1–2 ml of bacteriostatic water for injection (benzoyl alcohol preserved); direct the liquid against the glass vial wall; swirl vial with a gentle rotary motion until contents are dissolved completely; do not shake; the solution should be clear; if it is cloudy immediately after reconstitution

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or refrigeration, do not use; small colorless particles may be present after refrigeration, this is not unusual for solutions containing proteins; if reconstituted with sterile water for injection, use within 24 hr; if reconstituted with bacteriostatic water for injection (benzoyl alcohol preserved), the solution is stable for up to 14 days under refrigeration (2–8 degrees C or 36–46 degrees F); avoid freezing

• **Cartridges:** Available in 8.8-mg click. easy cartridges for use in a compatible injection device; a reconstitution device is supplied by the manufacturer and is used to mix the Serostim with accompanying diluent containing metacresol; after reconstitution, cartridges are stable under refrigeration for ≤21 days; avoid freezing

Serostim LQ:

• Before use, store refrigerated

• Available in 6-mg single-use cartridges that do not require reconstitution; administer using sterile disposable syringes and needles

• Bring to room temperature before use; discard single-use cartridge after use, even if some drug remains; discard cartridges after the expiration date stated on the product; do not freeze; protect from light

Tev-Tropin:

• Before reconstitution, store refrigerated

• Reconstitute each 5-mg vial with 1–5 ml bacteriostatic 0.9% sodium chloride (benzoyl alcohol preserved) for injection; direct the liquid against the glass vial wall; swirl vial with a gentle rotary motion until contents are dissolved completely; do not shake; the solution should be clear; if it is cloudy immediately after reconstitution, do not inject; small, colorless particles may be present after refrigeration, this is not unusual for solutions containing proteins; when administering to newborns, reconstitute with sterile normal saline for injection that is unpreserved

• Solution reconstituted with bacteriostatic 0.9% sodium chloride is stable for 14 days when stored refrigerated; solution reconstituted with sterile normal saline should be used only once; discard any remaining solution; avoid freezing

Valtropin:

• Before dispensing, store vials and diluent refrigerated; after dispensing to patients, may be stored at or below 77 degrees F for up to 3 mo

• Reconstitute each 5-mg vial with the entire contents of the accompanying diluent, which contains metacresol as a preservative; if patients are allergic to metacresol, sterile water for injection may be used; direct the liquid against the glass vial wall; swirl vial with a gentle rotary motion until contents are dissolved completely; do not shake; the solution should be clear, if it is cloudy or contains particulate matter immediately after reconstitution or after refrigeration, do not inject; the final concentration of the reconstituted solution is 3.33 mg/ml

• After reconstitution with the provided diluent, solutions may be stored refrigerated for up to 14 days; after reconstitution with sterile water for injection, use only one dose of Valtropin per vial and discard the unused portion if not used immediately

Zorbtive:

• Unreconstituted vials of drug and diluent may be stored at room temperature until expiration date

• Reconstitute each vial of 4 mg, 5 mg, or 6 mg with 0.5–1 ml sterile water for injection, USP; reconstitute each 8.8 mg with 1–2 ml bacteriostatic water for injection (0.9% benzyl alcohol preserved); in newborns or patients with a benzoyl alcohol hypersensitivity, sterile water for injection may be used; review manufacturer's labeling for expected concentrations; direct the liquid against the glass vial wall; swirl vial with a gentle rotary motion until contents are dissolved completely; do not shake; the solution should be clear, if it is cloudy after reconstitution or refrigeration, do not use; small color-

less particles may be present after refrigeration, this is not unusual for solutions containing proteins
• After reconstitution with sterile water for injection, use the solution immediately and discard any unused portion; when using bacteriostatic water for injection, reconstituted solutions are stable for up to 14 days refrigerated; avoid freezing vials of drug or diluent or reconstituted vials

IM route
• Inject deeply into a large muscle; aspirate before injection; rotate injection sites daily

SUBCUT route
• Volumes >1 ml of reconstituted solution is not recommended, do not inject intradermally
• Allow refrigerated solutions to come to room temperature before injection
• Subcutaneous injections may be given in the thigh, buttocks, or abdomen; rotate injection sites daily

SIDE EFFECTS

CNS: Headache, growth of intracranial tumor, fever, aggressive behavior
ENDO: Hyperglycemia, ketosis, hypothyroidism, thyroid hormone replacement may be needed
GI: Nausea, vomiting, pancreatitis
GU: *Hypercalciuria*
INTEG: Rash, urticaria, pain; inflammation at inj site, hematoma
MS: Tissue swelling, joint and muscle pain
SYST: Antibodies to growth hormone

PHARMACOKINETICS

Half-life 15-60 min, duration 7 days, metabolized in liver

INTERACTIONS

Increase: epiphyseal closure—androgens, thyroid hormones
Decrease: growth—glucocorticosteroids
Decrease: insulin, antidiabetic effect—dosage adjustment may be needed

Drug/Lab Test
Increase: glucose, urine glucose
Decrease: glucose thyroid hormones

NURSING CONSIDERATIONS

Assess:
• Signs/symptoms of diabetes
• Growth hormone antibodies if patient fails to respond to therapy
• Thyroid function tests: T_3, T_4, T_7, TSH to identify hypothyroidism
• **Allergic reaction:** rash, itching, fever, nausea, wheezing
• **Hypercalciuria:** urinary stones; groin, flank pain; nausea, vomiting, urinary frequency, hematuria, chills
• Growth rate, bone age of child at intervals during treatment
• **Respiratory infection:** in those with Prader-Willi syndrome, may have sleep apnea, upper airway obstruction; discontinue if obstruction occurs
• Rapid growth: assess for slipped capital femoral epiphysis may also occur in endocrine disorders
• Monitor ophthalmologic status baseline and periodically; intracranial hypertension may occur

Perform/provide:
• Storage in refrigerator for <1 mo; if reconstituted, <1 wk; do not use discolored or cloudy sol

Evaluate:
• Therapeutic response: growth in children

Teach patient/family:
• That treatment may continue for years; that regular assessments are required
• To maintain a growth record; to report knee/hip pain or limping
• That treatment is very expensive
• Identify creosol or benzyl-alcohol hypersensitivity before use

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sotalol (Rx)

(sot'ah-lahl)

Betapace, Betapace AF, Sorine

Func. class.: Antidysrhythmic group III

Chem. class.: Nonselective β-blocker

ACTION: Blockade of β_1- and β_2-receptors leads to antidysrhythmic effect, prolongs action potential in myocardial fibers without affecting conduction, prolongs QT interval, no effect on QRS duration

USES: Life-threatening ventricular dysrhythmias; Betapace AF: to maintain sinus rhythm with symptomatic atrial fibrillation/flutter

Unlabeled uses: Atrial fibrillation prophylaxis, cardiac surgery, PSVT, Wolff-Parkinson-White (WPW) syndrome

CONTRAINDICATIONS: Hypersensitivity to β-blockers, cardiogenic shock, heart block (2nd/3rd degree), sinus bradycardia, CHF, bronchial asthma, CCr <40 ml/min

Black Box Warning: Congenital or acquired long QT syndrome, hypokalemia

Precautions: Pregnancy (B), breastfeeding, major surgery, diabetes mellitus, renal/thyroid disease, COPD, well-compensated heart failure, CAD, nonallergic bronchospasm, electrolyte disturbances, bradycardia, peripheral vascular disease

Black Box Warning: Cardiac dysrhythmias, torsades de pointes, ventricular dysrhythmias, ventricular fibrillation

DOSAGE AND ROUTES

• **Adult: PO** initial 80 mg bid, may increase to 240-320 mg/day

• **Child >2 yr with normal renal function (unlabeled): PO** 30 mg/m² tid, adjust dose gradually after ≥36 hr to max 60 mg/m² tid

Renal dose

• **Adult: PO** CCr 30-60 ml/min, give q24hr; CCr 10-29 ml/min, give q36-48hr; CCr <10 ml/min, individualize dose

Life-threatening ventricular dysrhythmias

• **Adult (CCr 40-60 ml/min): IV** 75 mg over 5 hr daily, monitor QTc at end of each inf during initiation and titration; 80 mg PO = 75 mg IV; 120 mg PO = 112.5 mg IV; 160 mg PO = 150 mg IV

Betapace AF

• **Adult: PO** initial 80 mg bid, titrate upward to 120 mg bid during initial hospitalization

Renal dose (Betapace AF)

• **Adult: PO** CCr >60 ml/min, give q12hr; CCr 40-60 ml/min, give q24hr; CCr <40 ml/min, do not use

Available forms: Tabs 80, 120, 160, 240 mg; (Betapace AF) 80, 120, 160 mg; inj 150 mg/10 ml (15 mg/ml)

Administer:

PO route

• Before, at bedtime; tablet may be crushed or swallowed whole; give 1 hr before or 2 hr after meals

• Reduced dosage in renal dysfunction

• Betapace and Betapace AF are not interchangeable

• Do not give within 2 hr of antacids

IV route

• Dilute to vol of either 120 ml or 300 ml with D_5W, LR

• **75 mg dose:** withdraw 6 ml sotalol inj (90 mg), add 114 ml dilute to make 120 ml (0.75 mg/ml) or withdraw 6 ml sotalol inj (90 mg), add 294 ml dilute to make 300 ml (0.3 mg/ml)

• **112.5 mg dose:** withdraw 9 ml sotalol inj (135 ml), add 111 ml dilute to make 120 ml (1.125 mg/ml); or withdraw 9 ml sotalol (135 mg), add 291 ml dilute to make 300 ml (0.45 mg/ml)

• **150 mg dose:** withdraw 12 ml of sotalol (180 mg), add 108 ml to make 120 ml (1.5 mg/ml) or withdraw 12 ml sotalol (180 mg), add 288 ml to make 300 ml (0.6 mg/ml)

• Use inf pump and infuse 100 or 250 ml over 5 hr at a constant rate

SIDE EFFECTS

CNS: Dizziness, mental changes, drowsiness, fatigue, headache, catatonia, depression, anxiety, nightmares, paresthesia, lethargy, insomnia, decreased concentration

CV: Prodysrhythmia, prolonged QT, orthostatic hypotension, bradycardia, CHF, chest pain, ventricular dysrhythmias, AV block, peripheral vascular insufficiency, palpitations, torsades de pointes; life-threatening ventricular dysrhythmias (Betapace AF)

EENT: Tinnitus, visual changes, sore throat, double vision; dry, burning eyes

GI: Nausea, vomiting, diarrhea, dry mouth, flatulence, constipation, anorexia, indigestion

GU: Impotence, dysuria, ejaculatory failure, urinary retention

HEMA: Agranulocytosis, thrombocytopenic purpura (rare), thrombocytopenia, leukopenia

INTEG: Rash, alopecia, urticaria, pruritus, fever, diaphoresis

MISC: Facial swelling, decreased exercise tolerance, weight change, Raynaud's disease

MS: Joint pain, arthralgia, muscle cramps, pain

RESP: Bronchospasm, dyspnea, wheezing, nasal stuffiness, pharyngitis

PHARMACOKINETICS

PO: Onset 1-2 hr, peak 2-4 hr, duration 8-12 hr, half-life 12 hr, excreted unchanged in urine, crosses placenta, excreted in breast milk, protein binding 0%

INTERACTIONS

Black Box Warning: Increase: QT prolongation—class IA/III antidysrhythmics, some phenothiazines, β agonists, local anesthetics, tricyclics, haloperidol, chloroquine, droperidol, pentamidine; CYP3A4 inhibitors (amiodarone, clarithromycin, erythromycin, telithromycin, troleandomycin), arsenic trioxide, levomethadyl; CYP3A4 substrates (methadone, pimozide, QUEtiapine, quiNIDine, risperiDONE, ziprasidone)

Increase: hypoglycemia effect—insulin

Increase: effects of lidocaine

Increase: hypotension—diuretics, other antihypertensives, nitroglycerin

Decrease: β-blocker effects—sympathomimetics

Decrease: bronchodilating effects of theophylline, β_2-agonists

Decrease: hypoglycemic effects of sulfonylureas

Drug/Lab Test

False increase: urinary catecholamines

Interference: glucose, insulin tolerance tests

NURSING CONSIDERATIONS

Assess:

- I&O, weight daily; edema in feet, legs daily
- B/P, pulse q4hr; note rate, rhythm, quality
- Potassium, magnesium levels

Black Box Warning: Requires a specialized care setting: for a minimum of at least 3 days on maintenance dose with continuous ECG monitoring, creatinine clearance; calculate before dosing

Black Box Warning: Cardiogenic shock, acute pulmonary edema: Do not use, effect can further depress cardiac output

⚠ **QT syndrome:** apical/radial pulse before administration: notify prescriber of any significant changes; monitor ECG continuously (Betapace AF); use QT interval to determine patient eligibility; baseline QT must be ≤450 msec, if ≥500 msec, frequency or dosage must be decreased or drug discontinued

- Baselines of renal studies before therapy begins
- **Abrupt discontinuation:** do not discontinue abruptly, taper over 1-2 wk
- Dose should be adjusted slowly, with at least 3 days between changes, monitor ECG for QT interval

S

• Monitor electrolytes (hypokalemia, hypomagnesia) may increase dysrhythmias

Perform/provide:

• Storage in dry area at room temp; do not freeze

Evaluate:

• Therapeutic response: absence of life-threatening dysrhythmias

Teach patient/family:

• Not to discontinue product abruptly; to taper over 2 wk or may precipitate angina; to take exactly as prescribed

• Not to use antacids or OTC products containing α-adrenergic stimulants (nasal decongestants, OTC cold preparations) unless directed by prescriber

• To report bradycardia, dizziness, confusion, depression, fever

• To take pulse at home; advise patient when to notify prescriber

• To avoid alcohol, smoking, sodium intake

• To carry emergency ID to identify product being taken, allergies

• To avoid hazardous activities if dizziness present

• To report symptoms of CHF including difficulty breathing, especially on exertion or when lying down; night cough, swelling of extremities

• To wear support hose to minimize effects of orthostatic hypotension

• To monitor blood glucose if diabetic

• That hospitalization will be required for ≥3 days

TREATMENT OF OVERDOSE:

Lavage, IV atropine for bradycardia, IV theophylline for bronchospasm, digoxin, O_2, diuretic for cardiac failure; hemodialysis is useful for removal; administer vasopressor (norepinephrine) for hypotension, isoproterenol for heart block

spironolactone (Rx)

(speer'on-oh-lak'tone)

Aldactone, Novo-Spiroton ✱

Func. class.: Potassium-sparing diuretic

Chem. class.: Aldosterone antagonist

Do not confuse:

Aldactone/Aldactazide

ACTION: Competes with aldosterone at receptor sites in distal tubule, thereby resulting in the excretion of sodium chloride and water and the retention of potassium and phosphate

USES: Edema of CHF, hypertension, diuretic-induced hypokalemia, primary hyperaldosteronism (diagnosis, short-term treatment, long-term treatment), edema of nephrotic syndrome, cirrhosis of liver with ascites

Unlabeled uses: CHF, hirsutism in women, bronchopulmonary dysplasia (BPD), PMS, polycystic ovary syndrome, acne vulgaris, premenstrual syndrome

CONTRAINDICATIONS: Hypersensitivity, anuria, severe renal disease, hyperkalemia

Precautions: Breastfeeding, dehydration, hepatic disease, renal impairment, electrolyte imbalances, metabolic acidosis, gynecomastia, pregnancy (C)

Black Box Warning: Secondary malignancy

DOSAGE AND ROUTES

Edema/hypertension

• **Adult: PO** 25-200 mg/day in 1-2 divided doses

CHF

• **Adult: PO** 12.5-25 mg/day; max 50 mg/day

Edema

• **Child: PO** 1.5-3.3 mg/kg/day as single dose or in divided doses

Hypertension

• **Child (unlabeled):** **PO** 1.5-3.3 mg/kg/day in divided doses

Hypokalemia

• **Adult:** **PO** 25-100 mg/day; if **PO,** potassium supplements must not be used

Primary hyperaldosteronism diagnosis

• **Adult:** **PO** 400 mg/day × 4 days or 4 wk depending on test, then 100-400 mg/day maintenance

Edema (nephrotic syndrome, CHF, hepatic disease)

• **Adult:** **PO** 100 mg/day given as single dose or in divided doses, titrate to response

• **Child:** **PO** 1.5-3.3 mg/kg/day or 60 mg/m²/day given daily or in 2-4 divided doses

Renal dose

• **Adult:** **PO** CCr 10-50 ml/min; give dose q12-24hr; CCr <10 ml/min, avoid use

Polycystic ovary syndrome/hirsutism in women (unlabeled)

• **Adult:** **PO** 50-200 mg in 1-2 divided doses

Available forms: Tabs 25, 50, 100 mg

Administer:

• In AM to avoid interference with sleep

• With food; if nausea occurs, absorption may be decreased slightly

• Effect may take 2 wk

SIDE EFFECTS

CNS: *Headache,* confusion, drowsiness, lethargy, ataxia

ELECT: Hyperchloremic metabolic acidosis, hyperkalemia, hyponatremia

ENDO: Impotence, gynecomastia, irregular menses, amenorrhea, postmenopausal bleeding, hirsutism, deepening voice, breast pain

GI: *Diarrhea,* cramps, bleeding, gastritis, *vomiting,* anorexia, nausea, hepatocellular toxicity

HEMA: Agranulocytosis

INTEG: *Rash, pruritus,* urticaria

PHARMACOKINETICS

Onset 24-48 hr, peak 48-72 hr, metabolized in liver, excreted in urine, crosses placenta, protein binding >90%, terminal half-life 10-35 hr

INTERACTIONS

Increase: action of antihypertensives, digoxin, lithium

Increase: hyperchloremic acidosis in cirrhosis—cholestyramine

Increase: hyperkalemia—potassium-sparing diuretics, potassium products, ACE inhibitors, salt substitutes

Decrease: effect of anticoagulants, monitor INR/PT

Decrease: effect of spironolactone—ASA, NSAIDs

Drug/Food

Increase: hyperkalemia—potassium rich foods, potassium salt substitutes

Drug/Herb

Increase: hypotension—hawthorn, horse chestnut

Decrease: antihypertensive effect—ephedra

Increase: severe photosensitivity—St. John's wort

Increase: BUN, potassium

Decrease: sodium, magnesium

Drug/Lab Test

Interference: 17-OHCS, 17-KS, radioimmunoassay, digoxin assay

NURSING CONSIDERATIONS

Assess:

• **Hypokalemia:** polyuria, polydipsia; dysrhythmias, inluding a U wave on ECG

• **Hyperkalemia:** weakness, fatigue, dyspnea, dysrhythmias, confusion, fatigue

• Electrolytes: sodium, chloride, potassium, BUN, serum creatinine, ABGs, CBC

• Weight, I&O daily to determine fluid loss; effect of product may be decreased if used daily; ECG periodically with long-term therapy

• Signs of metabolic acidosis: drowsiness, restlessness

S

• Confusion, especially in geriatric patients; take safety precautions if needed
• **Hydration:** skin turgor, thirst, dry mucous membranes

Evaluate:
• Therapeutic response: improvement in edema of feet, legs, sacral area daily if medication is being used in CHF

Teach patient/family:
• To avoid foods with high potassium content: oranges, bananas, salt substitutes, dried apricots, dates; to avoid potassium salt substitutes
• That drowsiness, ataxia, mental confusion may occur; to observe caution when driving
• To notify prescriber of cramps, diarrhea, lethargy, thirst, headache, skin rash, menstrual abnormalities, deepening voice, breast enlargement
• To take in AM, to prevent sleeplessness
• To avoid hazardous activities until reaction is known
• To notify prescriber if pregnancy is planned or suspected, pregnancy (C), do not breastfeed

TREATMENT OF OVERDOSE:
Lavage if taken orally; monitor electrolytes, administer IV fluids, monitor hydration, renal, CV status

stavudine d4t (Rx)
(sta'vyoo-deen)
Zerit
Func. class.: Antiretroviral
Chem. class.: Nucleoside reverse transcriptase inhibitor (NRTI)

ACTION:
Prevents replication of HIV by the inhibition of the enzyme reverse transcriptase; causes DNA chain termination

USES:
Treatment of HIV-1 in combination with other antiretrovirals

CONTRAINDICATIONS:
Hypersensitivity to this product or zidovudine; didanosine, zalcitabine; severe peripheral neuropathy

Black Box Warning: Lactic acidosis

Precautions: Breastfeeding, advanced HIV infection, bone marrow suppression, renal disease, peripheral neuropathy, osteoporosis, obesity

Black Box Warning: Pregnancy (C), hepatic disease, pancreatitis

DOSAGE AND ROUTES
• **Adult >60 kg: PO** 40 mg q12hr
• **Adult <60 kg: PO** 30 mg q12hr
• **Child <30 kg: PO** 1 mg/kg q12hr
• **Child ≥30 kg, ≤60 kg: PO** 30 mg q12hr
• **Child >60 kg: PO** 40 mg q12hr

Renal dose
• **Adult: PO** CCr 26-50 ml/min, reduce by 50%, give q12hr; CCr 10-25 ml/min, reduce by 50%, give q24hr

Available forms: Caps 15, 20, 30, 40 mg; powder for oral sol 1 mg/ml

Administer:
• With/without meals; absorption does not appear to be lowered when taken with food
• Use after hemodialysis
• Every 12 hr around the clock
• Shake suspension well before using

SIDE EFFECTS
CNS: *Peripheral neuropathy,* insomnia, anxiety, depression, dizziness, confusion, *headache,* chills/fever, malaise, neuropathy
CV: Chest pain, vasodilation, hypertension
EENT: Conjunctivitis, abnormal vision
GI: Hepatotoxicity, *diarrhea, nausea, vomiting,* anorexia, dyspepsia, constipation, stomatitis, pancreatitis
HEMA: Bone marrow suppression, leukopenia, macrocytosis
INTEG: *Rash,* sweating, pruritus, benign neoplasms
MISC: Lactic acidosis, asthenia, lipodystrophy

MS: Myalgia, arthralgia
RESP: Dyspnea, pneumonia, asthma

PHARMACOKINETICS

Excreted in urine, breast milk; peak 1 hr; half-life: elimination 1-1.6 hr

INTERACTIONS

Increase: myelosuppression—other myelosuppressants
Increase: peripheral neuropathy—lithium, dapsone, chloramphenicol didanosine, ethambutol, hydrALAZINE, phenytoin, vinCRIStine, zalcitabine
Increase: stavudine levels—probenecid
Decrease: stavudine effect—methadone, zidovudine

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Lactic acidosis and severe hepatomegaly with steatosis: death may result

⚠ **Pancreatitis:** severe upper abdominal pain, radiating to back, nausea, vomiting usually when used in combination with didanosine

- Blood studies: WBC, differential, RBC, Hct, Hgb, platelets, serum amylase, lipase
- Renal tests: urinalysis, protein, blood, serum creatinine
- C&S before product therapy; product may be given as soon as culture taken
- Bowel pattern before, during treatment
- Weakness, tremors, confusion, dizziness; product may have to be decreased, discontinued
- Viral load, CD4 counts, plasma HIV RNA at baseline and throughout treatment
- **Peripheral neuropathy:** tingling, pain in extremities; discontinue product

Evaluate:

- Therapeutic response: decreased symptoms of HIV

Teach patient/family:

- **About the signs of peripheral neuropathy:** burning, weakness, pain, prickling feeling in extremities
- That product should not be given with antineoplastics
- That product is not a cure for AIDS but will control symptoms
- To notify prescriber if sore throat, swollen lymph nodes, malaise, fever occur; that other products may be needed to prevent other infections
- That, even with use of product, patient may pass AIDS virus to others
- That follow-up visits are necessary; that serious toxicity may occur; that blood counts must be done q2wk

⚠ That serious product interactions may occur if other medications are ingested; to see prescriber before taking chloramphenicol, dapsone, CISplatin, didanosine, ethambutol, lithium, antifungals, antineoplastics

Black Box Warning: To notify prescriber if pregnancy is planned or suspected, fatal lactic acidosis may occur, pregnancy (C), avoid breastfeeding

- That product may cause fainting or dizziness

⚠ HIGH ALERT

succinylcholine (Rx)

(suk-sin-ill-koe'leen)

Anectine, Quelicin

Func. class.: Neuromuscular blocker (depolarizing, ultra short)

S

ACTION: Inhibits transmission of nerve impulses by binding with cholinergic receptor sites, thus antagonizing action of acetylcholine; causes release of histamine

USES: Facilitation of endotracheal intubation, skeletal muscle relaxation during orthopedic manipulations

CONTRAINDICATIONS:

Hypersensitivity, malignant hyperthermia, trauma

Precautions: Pregnancy (C), breastfeeding, geriatric or debilitated patients, cardiac disease, severe burns, fractures (fasciculations may increase damage) electrolyte imbalances, dehydration, neuromuscular/respiratory/cardiac/renal/hepatic disease, collagen diseases, glaucoma, eye surgery

Black Box Warning: Children <2 yr, hyperkalemia, myopathy, rhabdomyolysis

DOSAGE AND ROUTES

• **Adult: IV** 0.3-1.1 mg/kg, max 150 mg, maintenance 0.04-0.07 mg/kg q5-10min as needed; **CONT IV INF** dilute to conc of 1-2 mg/ml in D_5W or NS 10-100 mcg/kg/min

• **Child: IV** initially 1-2 mg/kg; **CONT IV INF** not recommended

Available forms: Inj 20, 50, 100 mg/ml; powder for inj 100, 500 mg/vial, 1 g/vial

Administer:

• Give IV or IM; only experienced clinicians familiar with the use of neuromuscular blocking drugs should administer or supervise the use of this product

• Visually inspect parenteral products for particulate matter and discoloration before use

• Monitor heart rate and mechanical ventilator status during use

IM route

• Recommended for infants and other patients in whom a suitable vein is not accessible

• Inject into a large muscle, preferably high into the deltoid muscle; aspirate before injection

Rapid IV injection route

• Owing to tachyphylaxis and prolonged apnea, this method is not recommended for prolonged procedures; rapid IV injection of succinylcholine can result in profound bradycardia or asystole in pediatric patients; as with adults, the risk increases with repeated doses; pretreatment with atropine may be needed

• No dilution of injection solution is necessary

• Inject rapidly IV over 10–30 sec

Continuous IV infusion route

• Not recommended for infants and children owing to risk of malignant hyperthermia

• This route is preferred for long surgical procedures owing to possible tachyphylaxis and prolonged apnea associated with administration of repeated fractional doses

• Dilute succinylcholine to a concentration of 1–2 mg/ml with D_5W, D_5NS, NS, or 1/6 M sodium lactate injection; one gram of the powder for injection or 20 ml of a 50-mg/ml solution may be added to 1 L or 500 ml of diluent to give solutions containing 1 or 2 mg/ml, respectively; alternatively, 500 mg of the powder for injection or 10 ml of a 50 mg/ml solution may be added to 500 ml or 250 ml of diluent to give solutions containing 1 or 2 mg/ml, respectively

• Infuse IV at a rate of 2.5 mg/minute (range = 0.5–10 mg/min); adjust rate based on patient's response and requirements

Additive compatibilities: Amikacin, cephapirin, isoproterenol, meperidine, methyldopate, morphine, norepinephrine, scopolamine

Syringe compatibilities: Heparin

Y-site compatibilities: Etomidate, heparin, potassium chloride, propofol, vit B/C

SIDE EFFECTS

CV: Bradycardia, tachycardia; increased, decreased B/P; sinus arrest, dysrhythmias, edema

EENT: Increased secretions, intraocular pressure

HEMA: Myoglobulinemia

INTEG: Rash, flushing, pruritus, urticaria

MS: Weakness, muscle pain, fasciculations, prolonged relaxation, myalgia, rhabdomyolysis

RESP: Prolonged apnea, bronchospasm, cyanosis, respiratory depression, wheezing, dyspnea
SYST: Anaphylaxis, angioedema

PHARMACOKINETICS

Hydrolyzed in blood, excreted in urine (active/inactive metabolites)
IM: Onset 2-3 min, duration 10-30 min
IV: Onset 1 min, peak 2-3 min, duration 6-10 min

INTERACTIONS

• Dysrhythmias: theophylline
Increase: neuromuscular blockade—aminoglycosides, β-blockers, cardiac glycosides, clindamycin, lincomycin, procainamide, quiNIDine, local anesthetics, polymyxin antibiotics, lithium, opioids, thiazides, enflurane, isoflurane, magnesium salts, oxytocin
Drug/Herb
• Blocks succinylcholine: melatonin

NURSING CONSIDERATIONS

Assess:
• Electrolyte imbalances (K, Mg); may lead to increased action of product
• VS (B/P, pulse, respirations, airway) until fully recovered; rate, depth, pattern of respirations, strength of hand grip
• I&O ratio; check for urinary retention, frequency, hesitancy
• **Recovery:** decreased paralysis of face, diaphragm, leg, arm, rest of body
• **Allergic reactions:** rash, fever, respiratory distress, pruritus; product should be discontinued
• **Myopathy, rhabdomyolysis:** in pediatric patients (rare)
Perform/provide:
• Storage in refrigerator, powder at room temp; close tightly
• Reassurance if communication is difficult during recovery from neuromuscular blockade; postoperative stiffness is normal, soon subsides
Evaluate:
• Therapeutic response: paralysis of jaw, eyelid, head, neck, rest of body

TREATMENT OF OVERDOSE:

Neostigmine, atropine, monitor VS; may require mechanical ventilation

sucralfate (Rx)

(soo-kral'fate)
Carafate, Sulcrate ✱
Func. class.: Protectant, antiulcer
Chem. class.: Aluminum hydroxide, sulfated sucrose

Do not confuse:
Carafate/Cafergot

ACTION:

Forms a complex that adheres to ulcer site, adsorbs pepsin

USES:

Duodenal ulcer, oral mucositis, stomatitis after radiation of head and neck
Unlabeled uses: Gastric/aphthous ulcers, gastroesophageal reflux, NSAID-induced ulcer prophylaxis, proctitis, stomatitis, stress gastritis prophylaxis, *C. difficile*

CONTRAINDICATIONS:

Hypersensitivity
Precautions: Pregnancy (B), breastfeeding, children, renal failure; hypoglycemia (diabetics)

DOSAGE AND ROUTES

Duodenal ulcers
• **Adult: PO** 1 g qid 1 hr before meals, at bedtime
• **Child: PO** 40-80 mg/kg/day divided
Aphthous ulcer/stomatitis (unlabeled)
• **Adult: PO** 5-10 ml (500 mg-1 g) swished in mouth for several min; spit or swallow qid
Gastric ulcer/NSAID-induced ulcer prophylaxis/esophagitis/GERD (unlabeled)
• **Adult: PO** 1 g qid, 1 hr before meals and at bedtime
Available forms: Tabs 1 g; oral susp 1 g/10 ml

S

Administer:
PO route
- Do not crush or chew tabs; tabs may be broken or dissolved in water
- Do not take antacids 30 min before or after sucralfate
- On an empty stomach 1 hr before meals or other medications and at bedtime

SIDE EFFECTS

CNS: Drowsiness, dizziness
GI: *Dry mouth, constipation,* nausea, gastric pain, vomiting, bezoar (for critically ill patients)
INTEG: Urticaria, rash, pruritus

PHARMACOKINETICS

PO: Duration up to 6 hr

INTERACTIONS

Decrease: action of tetracyclines, phenytoin, fat-soluble vitamins, digoxin, ketoconazole, theophylline
Decrease: absorption of fluoroquinolones
Decrease: absorption of sucralfate—antacids, cimetidine, ranitidine

NURSING CONSIDERATIONS

Assess:
- **GI symptoms:** abdominal pain, blood in stools
- **Hypoglycemia:** may occur in patients with diabetes mellitus

Perform/provide:
- Storage at room temp

Evaluate:
- Therapeutic response: absence of pain, GI complaints

Teach patient/family:
- To take on empty stomach
- To take full course of therapy; not to use for >8 wk; to avoid smoking
- To avoid antacids within ½ hr of product
- To increase fluids, bulk, exercise to lessen constipation

sulfaSALAzine (Rx)

(sul-fa-sal'a-zeen)
Azulfidine, Azulfidine EN-tabs, Salazopyrin ♣
Func. class.: GI antiinflammatory, antirheumatic (DMARD)
Chem. class.: Sulfonamide

Do not confuse:
sulfaSALAzine/sulfiSOXAZOLE

ACTION: Prodrug to deliver sulfapyridine and 5-aminosalicylic acid to colon; antiinflammatory in connective tissue also

USES: Ulcerative colitis; RA; juvenile RA (Azulfidine EN-tabs)
Unlabeled uses: Crohn's disease

CONTRAINDICATIONS: Pregnancy at term, children <2 yr; hypersensitivity to sulfonamides or salicylates; intestinal, urinary obstruction; porphyria
Precautions: Pregnancy (B), breastfeeding, impaired renal/hepatic function, severe allergy, bronchial asthma, megaloblastic anemia

DOSAGE AND ROUTES

Bowel disease
- **Adult: PO** 3-4 g/day in divided doses; maintenance 2 g/day in divided doses q6hr
- **Child ≥6 yr: PO** 40-60 mg/kg/day in 4-6 divided doses then 30 mg/kg/day in 4 doses, max 2 g/day

Rheumatoid arthritis
- **Adult: PO** 0.5-1 g/day then increase daily dose by 500 mg/wk to 2 g/day in 2-3 divided doses

Juvenile rheumatoid arthritis
- **Child ≥6 yr: PO** 30-50 mg/kg/24 hr in 2 divided doses

Renal dose
- Modify dose based on renal impairment, response

Crohn's disease (unlabeled)
• **Adult: PO** 1 g/15 kg, max 5 g/day
Available forms: Tabs 500 mg; oral susp 250 mg/5 ml; del rel tabs 500 mg
Administer:
• Do not break, crush, chew del rel tabs
• With full glass of water to maintain adequate hydration; increase fluids to 2 L/day to decrease crystallization in kidneys
• Total daily dose in evenly spaced doses and after meals to help minimize GI intolerance

SIDE EFFECTS

CNS: Headache, confusion, insomnia, hallucinations, depression, vertigo, fatigue, anxiety, seizures, product fever, chills
CV: Allergic myocarditis
GI: *Nausea, vomiting, abdominal pain,* stomatitis, hepatitis, glossitis, pancreatitis, diarrhea
GU: Renal failure, toxic nephrosis, increased BUN, creatinine, crystalluria
HEMA: Leukopenia, neutropenia, thrombocytopenia, agranulocytosis, hemolytic anemia
INTEG: Rash, dermatitis, urticaria, Stevens-Johnson syndrome, erythema, photosensitivity
SYST: Anaphylaxis

PHARMACOKINETICS

PO: Partially absorbed; peak 1½-6 hr; duration 6-12 hr; half-life 6 hr; excreted in urine as sulfaSALAzine (15%), sulfapyridine (60%), 5-aminosalicylic acid, metabolites (20%-33%); excreted in breast milk; crosses placenta

INTERACTIONS

Increase: leukopenia risk—thiopurines (azaTHIOprine, mercaptopurine)
Increase: hypoglycemic response—oral hypoglycemics
Increase: anticoagulant effects—oral anticoagulants
Decrease: effect of cycloSPORINE, digoxin, folic acid
Decrease: renal excretion of methotrexate
Drug/Food
Decrease: iron/folic acid absorption
Drug/Lab Test
False positive: urinary glucose test

NURSING CONSIDERATIONS

Assess:
• Renal studies: BUN, creatinine, urinalysis (long-term therapy)
⚠ **Blood dyscrasias:** skin rash, fever, sore throat, bruising, bleeding, fatigue, joint pain; monitor CBC before therapy and q3mo
⚠ **Allergic reaction:** rash, dermatitis, urticaria, pruritus, dyspnea, bronchospasm
• **Ulcerative colitis, proctitis, other inflammatory bowel disease:** character, amount consistency of stools; abdominal pain, cramping, blood, mucous
• **Rheumatoid arthritis:** assess mobility, joint swelling, pain, ability to complete activities of daily living
Perform/provide:
• Storage in tight, light-resistant container at room temp
Evaluate:
• Therapeutic response: absence of fever, mucus in stools, pain in joints
Teach patient/family:
• To take each oral dose with full glass of water to prevent crystalluria
• That contact lenses, urine, skin may be yellow-orange
• To avoid sunlight or use sunscreen to prevent burns
• To notify prescriber of skin rash, sore throat, fever, mouth sores, unusual bruising, bleeding

S

SUMAtriptan (Rx)

(soo-ma-trip'tan)

ALSUMA Auto-injector, Imitrex, Sumavel DosePro

Func. class.: Antimigraine agent

Chem. class.: 5-HT_1B/D receptor agonist, abortive agent, triptan

Do not confuse:
SUMAtriptan/somatropin

ACTION: Binds selectively to the vascular 5-HT_1B/D receptor subtype, exerts antimigraine effect; causes vasoconstriction in cranial arteries

USES: Acute treatment of migraine with/without aura and cluster headache

CONTRAINDICATIONS: Angina pectoris, history of MI, documented silent ischemia, Prinzmetal's angina, ischemic heart disease, IV use, concurrent ergotamine-containing preparations, uncontrolled hypertension, hypersensitivity, basilar or hemiplegic migraine

Precautions: Pregnancy (C), breastfeeding, children <18 yr, geriatric patients, postmenopausal women, men >40 yr, risk factors for CAD, hypercholesterolemia, obesity, diabetes, impaired renal/hepatic function, overuse

DOSAGE AND ROUTES

• **Adult: SUBCUT** ≤6 mg; may repeat in 1 hr; max 12 mg/24 hr; **PO** 25 mg with fluids, if no relief in 2 hr, give another dose, max 200 mg/day; **NASAL** single dose of 5, 10, or 20 mg in 1 nostril, may repeat in 2 hr, max 40 mg/24 hr; 1 puff each nostril q2hr

Hepatic dose

• **Adult: PO** 25 mg; if no response after 2 hr, give ≤50 mg

Available forms: Inj 4, 6 mg/0.5 ml; tabs 25, 50, 100 mg; nasal spray 5 mg/100 mcl-U; dose spray device 20 mg/100 mcl-U

Administer:

PO route

• Swallow tabs whole; do not break, crush, or chew

• Take tabs with fluids as soon as symptoms appear; may take a 2nd dose >4 hr; max 200 mg/24 hr

SUBCUT route

SUBCUT only just below the skin; avoid IM or IV administration; use only for actual migraine attack

• Give 1st dose supervised by medical staff to patients with coronary artery disease or those at risk for CAD

Nasal route

• May give as 2 sprays of 5 mg in 1 nostril or 1 spray in each nostril (10 mg)

SIDE EFFECTS

CNS: *Tingling, hot sensation, burning, feeling of pressure, tightness, numbness, dizziness, sedation,* headache, anxiety, fatigue, cold sensation

CV: *Flushing,* MI, hypo/hypertension

EENT: Throat, mouth, nasal discomfort; vision changes

GI: Abdominal discomfort

INTEG: Inj site reaction, sweating

MS: *Weakness, neck stiffness,* myalgia

RESP: Chest tightness, pressure

PHARMACOKINETICS

Onset of pain relief 10 min-2 hr, peak 10-20 min; 10%-20% plasma protein binding; metabolized in liver (metabolite); excreted in urine, feces; nasal spray half-life 2 hr

INTERACTIONS

Increase: vasospastic effects: ergot, ergot derivatives

Increase: serotonin syndrome—SSRIs, SNRIs, serotonin-receptor agonists, sibutramine

Increase: SUMAtriptan effect—MAOIs

Drug/Herb

• Serotonin syndrome: SAM-e, St. John's wort

NURSING CONSIDERATIONS

Assess:

- **Migraine:** type of pain, aura; alleviating, aggravating factors; sensitivity to light, noise
- **Serotonin syndrome:** delirium, coma, agitation, diaphoresis, hypertension, fever, tremors; may resemble neuroleptic malignant syndrome in patients taking SSRIs, SNRIs
- B/P; signs, symptoms of coronary vasospasms, ECG
- Tingling, hot sensation, burning, feeling of pressure, numbness, flushing, inj site reaction
- Stress level, activity, recreation, coping mechanisms
- Neurologic status: LOC, blurring vision, nausea, vomiting, tingling in extremities preceding headache
- Ingestion of tyramine foods (pickled products, beer, wine, aged cheese), food additives, preservatives, colorings, artificial sweeteners, chocolate, caffeine, which may precipitate these types of headaches
- Renal function, urinary output

Perform/provide:

- Quiet, calm environment with decreased stimuli: noise, bright light, excessive talking

Evaluate:

- Therapeutic response: decrease in frequency, severity of migraine

Teach patient/family:

- To report chest pain, tightness; sudden, severe abdominal pain; swelling of eyelids, face, lips; skin rash to prescriber immediately
- To notify prescriber if pregnancy is planned or suspected; to use contraception while taking product
- **Nasal spray:** to use 1 spray in 1 nostril, may repeat if headache returns; not to repeat if pain continues after 1st dose
- To have a dark, quiet environment
- To avoid hazardous activities if dizziness, drowsiness occur
- To avoid alcohol; may increase headache
- To use SUBCUT inj technique, nasal route if prescribed
- That product does not reduce number of migraines; to be used for acute migraine; to use as symptoms occur

SUNItinib (Rx)

(soo-nit'-in-ib)

Sutent

Func. class.: Antineoplastic—miscellaneous

Chem. class.: Protein-tyrosine kinase inhibitor

ACTION: Inhibits multiple receptor tyrosine kinases (RTKs); some are responsible for tumor growth

USES: Gastrointesitnal stromal tumors (GIST) after disease progression or intolerance to imatinib; advanced renal carcinoma, pancreatic neuroendocrine tumors (pNET) in patients with unresectable locally advanced/metastatic disease

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, hypersensitivity

Precautions: Children, geriatric patients, active infections, QT prolongation, torsades de pointes, stroke, heart failure

Black Box Warning: Hepatic disease

DOSAGE AND ROUTES

Gastrointestinal stromal tumors (GIST)/renal cell cancer

- **Adult: PO** 50 mg/day × 4 wk then 2 wk off; may increase or decrease dose by 12.5 mg; if administered with CYP3A4 inducers, give 87.5 mg/day; if given with CYP3A4 inhibitors, give 37.5 mg/day

Pancreatic neuroendocrine (pNET)

- **Adult: PO** 37.5 mg daily continuously, increase or decrease by 12.5 mg based on tolerance, avoid potent CYP3A4 inhibitors/inducers; if used with CYP3A4 inhibitors, decrease SUNItinib dose to

minimum of 25 mg/day; if used with CYP3A4 inducers, increase SUNItinib to max 62.5 mg/day

Available forms: Caps 12.5, 25, 50 mg

Administer:

- With meal and large glass of water to decrease GI symptoms

SIDE EFFECTS

CNS: CNS hemorrhage, headache, dizziness, insomnia, seizures, fatigue

CV: Hypertension, left ventricular dysfunction, QT prolongation, cardiotoxicity, torsades de pointes, thrombotic microangiopathy, cardiac arrest, thromboembolism

ENDO: Hypo/hyperthyroidism

GI: *Nausea,* hepatotoxicity, vomiting, dyspepsia, *anorexia, abdominal pain,* altered taste, *constipation,* stomatitis, mucositis, pancreatitis, diarrhea, GI bleeding/perforation

GU: Nephrotic syndrome

HEMA: Neutropenia, thrombocytopenia, hemolytic anemia, leukopenia

INTEG: *Rash, yellow skin discoloration,* depigmentation of hair or skin, alopecia, necrotizing fasciitis, pyoderma gangrenosum

MS: Pain, arthralgia, myalgia, myopathy, rhabdomyolysis

RESP: Cough, dyspnea, pulmonary embolism

SYST: Bleeding, electrolyte abnormalities, hand-foot syndrome, serious infection

PHARMACOKINETICS

Protein binding 95%; metabolized by CYP3A4; excreted in feces, small amount in urine; peak plasma levels 6-12 hr; terminal half-life 40-60 hr (SUNItinib); active metabolite 80-110 hr

INTERACTIONS

⚠ Increase: microangiopathic hemolytic anemia—bevacizumab; avoid concurrent use

⚠ Increase: QT prolongation—class IA/III antidysrhythmics, some phenothiazines, β agonists, local anesthetics, tricyclics, haloperidol, chloroquine, droperidol, pentamidine; CYP3A4 inhibitors (amiodarone, clarithromycin, erythromycin, telithromycin, troleandomycin), arsenic trioxide, levomethadyl; CYP3A4 substrates (methadone, pimozide, QUEtiapine, quiNIDine, risperiDONE, ziprasidone)

Increase: hepatotoxicity—acetaminophen

Increase: plasma concentrations of simvastatin, calcium channel blockers; warfarin; avoid use with warfarin, use low-molecular-weight anticoagulants instead

Decrease: SUNItinib concentrations—dexamethasone, phenytoin, carBAMazepine, rifampin, PHENobarbital

Drug/Herb

Decrease: SUNItinib concentration—St. John's wort

Drug/Food

Increase: plasma concentrations—grapefruit juice

NURSING CONSIDERATIONS

Assess:

⚠ ANC and platelets; if ANC $<1 \times 10^9$/L and/or platelets $<50 \times 10^9$/L, stop until ANC $>1.5 \times 10^9$/L and platelets $>75 \times 10^9$/L; if ANC $<0.5 \times 10^9$/L and/or platelets $<10 \times 10^9$/L, reduce dosage by 200 mg; if cytopenia continues, reduce dosage by another 100 mg; if cytopenia continues for 4 wk, stop product until ANC $\geq 1 \times 10^9$/L

⚠ CV status: hypertension, QT prolongation can occur; monitor left ventricular ejection fraction (LVEF), (MUGA) at baseline, periodically; ECG

⚠ Renal toxicity: if bilirubin $>3 \times$ IULN, withhold SUNItinib until bilirubin levels return to $<1.5 \times$ IULN; electrolytes

⚠ Hepatotoxicity: monitor LFTs before treatment, monthly; if liver transaminases $>5 \times$ IULN, withhold SUNItinib until transaminase levels return to $<2.5 \times$ IULN

- **CHF:** adrenal insufficiency in those experiencing trauma
- Bleeding: epistaxis; rectal, gingival,

tumor-related hemorrhage may occur rapidly

Perform/provide:
- Nutritious diet with iron, vitamin supplement, low fiber, few dairy products
- Storage at 25° C (77° F)

Evaluate:
- Therapeutic response: decrease in size of tumor

Teach patient/family:
- To report adverse reactions immediately: SOB, bleeding
- About reason for treatment, expected result
- That many adverse reactions may occur: high B/P, bleeding, mouth swelling, taste change, skin discoloration, depigmentation of hair/skin
- To avoid persons with known upper respiratory infections; that immunosuppression is common
- To avoid grapefruit juice

⚠ To report if pregnancy is planned or suspected, pregnancy (D)

suprofen ophthalmic

See Appendix B

tacrolimus (Rx) (PO, IV)

(tak-row'lim-us)

Prograf

tacrolimus (topical) (Rx)

Protopic

Func. class.: Immunosuppressant

Chem. class.: Macrolide

ACTION: Produces immunosuppression by inhibiting T-lymphocytes

USES: Organ transplants to prevent rejection; **topical:** atopic dermatitis

Unlabeled uses: Severe recalcitrant psoriasis, contact dermatitis, GVHD prophylaxis/disease, pancreas/heart/kidney/liver/lung/small bowel transplant rejection, uveitis, ulcerative colitis, nephrotic syndrome, lichen sclerosus

CONTRAINDICATIONS: Children <2 yr (topical); hypersensitivity to this product or to some kinds of castor oil (IV); long-term use (topical)

Precautions: Pregnancy (C), breastfeeding, severe renal/hepatic disease; diabetes mellitus, hyperkalemia, hyperuricemia, hypertension, acute bronchospasm, African American patients, heart failure, seizures, QT prolongation

Black Box Warning: Children <12, lymphomas, infection, neoplastic disease, neonates, infants, requires a specialized setting, requires an experienced clinician

DOSAGE AND ROUTES

Kidney transplant rejection prophylaxis
- **Adult: IV** 0.03-0.05 mg/kg/day as **CONT INF,** give no sooner than 6 hr after transplantation

Liver transplant rejection prophylaxis
- **Adult: PO** 0.10-0.15 mg/kg/day in 2 divided doses q12hr, give no sooner than 6 hr after transplantation; **IV** 0.03-0.05 mg/kg/day as **CONT INF,** give no sooner than 6 hr after transplantation

Heart transplant rejection prophylaxis
- **Adult: PO** 0.075 mg/kg/day in 2 divided doses q12hr, give no sooner than 6 hr after transplantation; **IV** 0.01 mg/kg/day as **CONT INF,** give no sooner than 6 hr after transplantation

Atopic dermatitis
- **Adult: TOP** use 0.03% or 0.1% ointment, apply bid × 7 days after clearing of signs
- **Child ≥ 2-15 yr: TOP** 0.03% ointment, apply bid × 7 days after clearing of signs

Graft-versus-host disease (Orphan drug)
- **Adult and adolescent: IV** 0.1 mg/kg/day in 2 divided doses given with other immunosuppressants or **PO** 0.3 mg/kg/day in 2 divided doses
- **Child: CONT IV INF** 0.1 mg/kg/day

T

Graft-versus-host prophylaxis (unlabeled)

• **Adult: CONT IV INF** 0.03 mg/kg/day starting 1-2 days before bone marrow transplant; **PO** 0.12 mg/kg/day in 2 divided doses

• **Adolescent and child: PO** 0.12 mg/kg/day in 2 divided doses

Heart transplant rejection (unlabeled)

• **Adult: IV** 0.05 mg/kg/day or **PO** 0.2-0.3 mg/kg/day in 2 divided doses; adjust to maintain whole blood conc 7-15 ng/ml

Lung transplant rejection (unlabeled)

• **Adult: PO** 0.15 mg/kg/day, maintain 12-hr trough, whole blood conc 1-1.5 ng/ml

Small bowel transplant rejection (unlabeled)

• **Adult: IV** 0.1-0.15 mg/kg/day then **PO** 0.3 mg/kg/day in divided doses

Contact dermatitis (unlabeled)

• **Adult: TOP** 0.1% ointment, apply bid × 8 wk

Available forms: Inj 5 mg/ml; caps 0.5, 1, 5 mg; ointment 0.03%, 0.1%

Administer:

PO route

• Give on empty stomach, food decreases absorption

• For several days before transplant surgery, patients should be placed in protective isolation

Topical route

• Apply thin layers to affected skin only, rub in gently

• Do not use occlusive dressings

• Use on small area of skin

• Topical ointment has risk of developing cancer, use only when other options have failed

Continuous IV INF route

• After diluting in 0.9% NaCl or D_5W to 0.004 to 0.02 mg/ml as continuous inf over 24 hr

Y-site compatibilities: Alemtuzumab, alfentanil, amifostine, amikacin, aminophylline, amiodarone, amphotericin B colloidal, amphotericin B liposome, anidulafungin, argatroban, atracurium, aztreonam, benztropine, bivalirudin, bleomycin, bumetanide, buprenorphine, busulfan, butorphanol, calcium acetate/chloride/gluconate, CARBOplatin, carmustine, caspofungin, ceFAZolin, cefoperazone, cefotaxime, cefoTEtan, cefOXitin, cefTAZidime, ceftizoxime, ceftRIAXone, cefuroxime, chloramphenicol, chlorproMAZINE, cimetidine, ciprofloxacin, cisatracurium, CISplatin, clindamycin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, dexmedetomidine, dexrazoxane, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, dolasetron, DOPamine, doripenem, doxacurium, DOXOrubicin hydrochloride, doxycycline, droperidol, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, ertapenem, erythromycin, esmolol, etoposide, etoposide phosphate, famotidine, fenoldopam, fentaNYL, fluconazole, fludarabine, foscarnet, fosphenytoin, gemcitabine, gentamicin, glycopyrrolate, granisetron, haloperidol, heparin, hydrALAZINE, hydrocortisone, HYDROmorphone, IDArubicin, ifosfamide, imipenem/cilastatin, inamrinone, insulin, isoproterenol, ketorolac, labetalol, leucovorin, levofloxacin, levorphanol, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, meperidine, meropenem, mesna, metaraminol, methotrexate, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, micafungin, midazolam, milrinone, mitoMYcin, mitoXANtrone, mivacurium, morphine, multivitamins, nafcillin, nalbuphine, naloxone, nesiritide, niCARdipine, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxacillin, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pancuronium, PEMEtrexed, penicillin G, pentamidine, pentazocine, perphenazine, phentolamine, phenylephrine, piperacillin/tazobactam, potassium chloride/phosphates, procainamide, prochlorper-

azine, promethazine, propranolol, quinapristin/dalfopristin, ranitidine, remifentanil, rocuronium, sodium acetate/bicarbonate/phosphates, streptozocin, succinylcholine, SUFentanil, teniposide, theophylline, thiotepa, ticarcillin/clavulanate, tigecycline, tirofiban, tobramycin, tolazoline, trimethobenzamide, vancomycin, vasopressin, vecuronium, verapamil, vinCRIStine, vinorelbine, voriconazole, zidovudine, zoledronic acid

SIDE EFFECTS

CNS: *Tremors, headache,* insomnia, paresthesia, chills, fever, seizures, posterior reversible encephalopathy syndrome, BK-virus–associated nephropathy

CV: Hypertension, myocardial hypertrophy, prolonged QTc, cardiomyopathy

EENT: Blurred vision, photophobia

GI: Nausea, vomiting, diarrhea, constipation, GI bleeding

GU: UTIs, albuminuria, hematuria, proteinuria, renal failure, hemolytic uremic syndrome

HEMA: Anemia, leukocytosis, thrombocytopenia, purpura

INTEG: Rash, flushing, itching, alopecia

META: Hirsutism, hyperglycemia, hyperuricemia, hypo/hyperkalemia, hypomagnesemia

MS: Back pain, muscle spasms

RESP: Pleural effusion, atelectasis, dyspnea, interstitial lung disease

SYST: Anaphylaxis, infection, malignancy

PHARMACOKINETICS

PO: Extensively metabolized, half-life 10 hr, 75% protein binding

INTERACTIONS

⚠ **Increase:** QT prolongation—class IA/III antidysrhythmics, some phenothiazines, β agonists, local anesthetics, tricyclics, haloperidol, chloroquine, droperidol, pentamidine; CYP3A4 inhibitors (amiodarone, clarithromycin, erythromycin, telithromycin, troleandomycin), arsenic trioxide, levomethadyl; CYP3A4 substrates (methadone, pimozide, QUEtiapine, quiNIDine, risperiDONE, ziprasidone); do not use together

⚠ **Increase:** toxicity—aminoglycosides, CISplatin, cycloSPORINE

Increase: blood levels—antifungals, calcium channel blockers, cimetidine, danazol, mycophenolate, mofetil

Decrease: blood levels—carBAMazepine, PHENobarbital, phenytoin, rifamycin

Decrease: effect of live-virus vaccines

Drug/Herb

Decrease: immunosuppression—astragalus, echinacea, melatonin

Decrease: effect—ginseng, St. John's wort

Drug/Food

Increase: effect—grapefruit juice

Decreased absorption: food

Drug/Lab Test

Increase: glucose, BUN, creatinine

Increase or decrease: LFTs, potassium

Decrease: magnesium, Hgb, platelets

NURSING CONSIDERATIONS

Assess:

- Blood studies: Hgb, WBC, platelets during treatment monthly; if leukocytes $<3000/mm^3$ or platelets $<100,000/mm^3$, product should be discontinued or reduced; decreased hemoglobulin level may indicate bone marrow suppression
- Hepatic studies: alk phos, AST, ALT, amylase, bilirubin; for hepatotoxicity: dark urine, jaundice, itching, light-colored stools; product should be discontinued
- Serum creatinine/BUN, serum electrolytes, lipid profile, serum tacrolimus conc

⚠ **Anaphylaxis:** rash, pruritus, wheezing, laryngeal edema; stop infusion, initiate emergency procedures

- **QT prolongation:** ECG, ejection fraction; assess for chest pain, palpitations, dyspnea

Evaluate:

- Therapeutic response: absence of graft rejection; immunosuppression in patients with autoimmune disorders

T

Teach patient/family:
PO route
- To report fever, rash, severe diarrhea, chills, sore throat, fatigue; that serious infections may occur; to report clay-colored stools, cramping **(hepatotoxicity), nephrotoxicity,** signs of diabetes mellitus
- To avoid crowds, persons with known infections to reduce risk for infection; to avoid eating raw shellfish
- To avoid exposure to natural or artificial sunlight
- Not to breastfeed while taking product
- That repeated lab tests will be needed during treatment
- To avoid vaccines
- Not to use with alcohol, grapefruit
- To report if pregnancy is planned or suspected

Black Box Warning: To report symptoms of lymphoma

tadalafil (Rx)

(tah-dal'a-fil)

Adcirca, Cialis

Func. class.: Impotence agent

Chem. class.: Phosphodiesterase type 5 inhibitor

ACTION: Inhibits phosphodiesterase type 5 (PDE5); enhances erectile function by increasing the amount of cGMP, which causes smooth muscle relaxation and increased blood flow into the corpus cavernosum; improves erectile function for up to 36 hr

USES: Treatment of erectile dysfunction, benign prostatic hyperplasia (BPH) with or without erectile dysfunction pulmonary arterial hypertension (PAH) (Adcirca only)
Unlabeled uses: Sexual dysfunction in males receiving antidepressants

CONTRAINDICATIONS: Newborns, children, women, hypersensitivity, patients taking organic nitrates either regularly and/or intermittently, patients taking any α-adrenergic antagonist other than 0.4 mg once-daily tamsulosin
Precautions: Pregnancy (B) although not indicated for females, anatomic penile deformities, sickle cell anemia, leukemia, multiple myeloma, CV/renal/hepatic disease, bleeding disorders, active peptic ulcer, prolonged erection

DOSAGE AND ROUTES

Erectile dysfunction
- **Adult: PO** (Cialis) 10 mg taken before sexual activity, dose may be reduced to 5 mg or increased to max 20 mg; usual max dosing frequency is 1×/day; once-daily dosing 2.5 mg/day at same time each day

BPH
- **Adult: PO** 5 mg bid at the same time every day

Renal dose
- **Adult: PO** CCr 51-80 ml/min: no adjustment for erectile dysfunction, 20 mg/day initially for pulmonary hypertension; CCr 31-50 ml/min, 5 mg/day, max 10 mg q48hr; CCr <30 ml/min, max 5 mg q72hr

Hepatic dose
- **Adult: PO** (Child-Pugh A, B) max 10 mg/day or 20 mg/day, (pulmonary hypertension) max 40 mg/day; (Child-Pugh C) not recommended

Concomitant medications
- Ketoconazole, itraconazole, ritonavir, max 10 mg q72hr

Pulmonary hypertension
- **Adult: PO (Adcirca only)** 40 mg daily
- **Adult taking ritonavir: PO** 20 mg daily initially then increase to 40 mg daily as tolerated

Male sexual dysfunction (from antidepressants) (unlabeled)
- **Adult: PO** (Cialis) 10-20 mg before sexual activity

Available forms: Tabs 2.5, 5, 10, 20 mg; PO tab (Adcirca) 20 mg
Administer:
- Product should not be used with nitrates in any form

• **Sexual dysfunction:** give before sexual activity; do not use more than 1×/day
• **Pulmonary hypertension:** give Adcirca with/without meals

SIDE EFFECTS

CNS: *Headache, flushing, dizziness,* seizures, transient global amnesia
CV: Hypotension, QT prolongation
INTEG: Stevens-Johnson syndrome, exfoliative dermatitis, urticaria
MISC: Back pain/myalgia, *dyspepsia, nasal congestion, UTI,* blurred vision, changes in color vision, *diarrhea,* pruritus, priapism, nonarteritic ischemic optic neuropathy (NAION), hearing loss

PHARMACOKINETICS

Rapidly absorbed; metabolized by liver by CYP3A4; terminal half-life 17.5 hr; peak $^1/_2$-6 hr; excreted primarily as metabolites in feces, urine; excreted 61% in feces, 36% in urine; 94% protein bound; rate and extent of absorption not influenced by food

INTERACTIONS

⚠ Do not use with nitrates because of unsafe drop in B/P, which could result in MI or stroke
Increase: tadalafil levels—itraconazole, ketoconazole, ritonavir (although not studied, may also include other HIV protease inhibitors)
Decrease: B/P—alcohol, α-blockers, amLODIPine, angiotensin II receptor blockers, enalapril
Decrease: effects of tadalafil—bosentan, antacids
Drug/Food
Increase: tadalafil effect—grapefruit

NURSING CONSIDERATIONS

Assess:
• **Cialis:** underlying cause of erectile dysfunction before treatment; use of organic nitrates that should not be used with this product; any severe loss of vision while taking this or any similar products
• **Adcirca:** hemodynamic parameters at baseline and periodically
Evaluate:
• Therapeutic response: ability to engage in sexual intercourse, improvement in exercise ability in pulmonary hypertension
Teach patient/family:
• To take 1 hr before sexual activity
• Not to drink large amounts of alcohol
• That product does not protect against sexually transmitted diseases, including HIV
• That product has no effect in the absence of sexual stimulation; to seek medical help if erection lasts >4 hr
• To tell physician about all medicines, vitamins, herbs being taken, especially ritonavir, indinavir, ketoconozole, itraconazole, erythromycin, nitrates, α-blockers; that tadalafil is contraindicated for use with α-blockers except 0.4 mg/day tamsulosin
⚠ To notify prescriber immediately and to stop taking product if vision, hearing loss occur or if erection lasts >4 hr or if chest pain occurs

tamoxifen (Rx)

(ta-mox'i-fen)
Apo-Tamox ✤, Nolvadex ✤, Tamofen ✤
Func. class.: Antineoplastic
Chem. class.: Antiestrogen hormone

T

ACTION: Inhibits cell division by binding to cytoplasmic estrogen receptors; resembles normal cell complex but inhibits DNA synthesis and estrogen response of target tissue

USES: Advanced breast carcinoma not responsive to other therapy in estrogen-receptor–positive patients (usually postmenopausal), prevention of breast cancer, after breast surgery/radiation for ductal carcinoma in situ

Unlabeled uses: Mastalgia, to reduce pain/size of gynecomastia, ovulation stimulation, malignant carcinoid tumor, carcinoid syndrome, metastatic melanoma, desmoid tumors, McCune-Albright syndrome (female pediatric patients), osteoporosis, bipolar I disorder, infertility, precocious puberty, gynecomastia, mastalgia

CONTRAINDICATIONS:

Pregnancy (D), breastfeeding, hypersensitivity

Black Box Warning: Thromboembolic disease

Precautions: Women of childbearing age, leukopenia, thrombocytopenia, cataracts

Black Box Warning: Endometrial cancer, stroke

DOSAGE AND ROUTES

Breast cancer

- **Adult: PO** 20-40 mg/day for 5 yr; doses >20 mg/day, divide AM/PM

High risk for breast cancer

- **Adult: PO** 20 mg/day × 5 yr

DCIS

- **Adult: PO** 20 mg/day × 5 yr

McCune-Albright syndrome/ precocious puberty (unlabeled)

- **Child 2-10 yr (girls): PO** 20 mg/day for ≤1 yr

Bipolar I disorder (unlabeled)

- **Adult: PO** 40 mg bid

Stimulation of ovulation with infertility (unlabeled)

- **Adult: PO** 20-80 mg/day × 5 days

Mastalgia (unlabeled)

- **Adult (female): PO** 10-20 mg/day × 3-6 mo

Mastalgia/gynecomastia in men with prostate cancer (unlabeled)

- **Adult (male): PO** 20 mg/day for ≤1 yr

Available forms: Tabs 10, 20 mg

Administer:

- Do not break, crush, or chew tabs
- Antacid before oral agent; give product after evening meal, before bedtime; give with food or fluids for GI symptoms
- Antiemetic 30-60 min before product to prevent vomiting

SIDE EFFECTS

CNS: *Hot flashes, headache, lightheadedness,* depression, mood changes

CV: Chest pain, stroke, fluid retention, flushing

EENT: Ocular lesions, retinopathy, cataracts, corneal opacity, blurred vision (high doses)

GI: *Nausea, vomiting,* altered taste (anorexia)

GU: Vaginal bleeding, pruritus vulvae, uterine malignancies, *altered menses, amenorrhea*

HEMA: Thrombocytopenia, leukopenia, DVT

INTEG: *Rash,* alopecia

META: Hypercalcemia

RESP: Pulmonary embolism

PHARMACOKINETICS

PO: Peak 4-7 hr, half-life 7 days (1 wk terminal), metabolized in liver, excreted primarily in feces

INTERACTIONS

Increase: risk for death from breast cancer—PARoxetine

Increase: bleeding—anticoagulants

Increase: tamoxifen levels—bromocriptine

Increase: thromboembolic events—cytotoxics

Increase: toxicity—CYP3A4 inhibitors (aprepitant, antiretroviral protease inhibitors, clarithromycin, danazol, delavirdine, diltiazem, erythromycin, fluconazole, FLUoxetine, fluvoxaMINE, imatinib, ketoconazole, mibefradil, nefazodone, telithromycin, voriconazole)

Decrease: tamoxifen levels—aminoglutethimide, rifamycin

Decrease: letrozole levels—letrozole

Decrease: tamoxifen effect—CYP3A4 inducers (barbiturates, bosentan, carBAMazepine, efavirenz, phenytoins, nevirapine, rifabutin, rifampin)

Decrease: tamoxifen effects—CYP2D6 inhibitors (antidepressants)

Drug/Herb

• Avoid use with St. John's wort, dong qui, black cohosh

Drug/Lab Test

Increase: serum calcium, T_4, AST, ALT, cholesterol, triglycerides

NURSING CONSIDERATIONS

Assess:

• CBC, differential, platelet count weekly; withhold product if WBC count is <3500 or platelet count is <100,000; notify prescriber; breast exam, mammogram, pregnancy test, bone mineral density, LFTs, serum calcium, serum lipid profile, periodic eye exams (cataracts, retinopathy)

Black Box Warning: Bleeding q8hr: hematuria, guaiac, bruising, petechiae, mucosa or orifices

• Effects of alopecia on body image; discuss feelings about body changes

⚠ **Uterine malignancies, symptoms of stroke, pulmonary embolism** that may occur in women with ductal carcinoma in situ (DCIS) and women at high risk for breast cancer

⚠ **Severe allergic reactions:** rash, pruritus, urticaria, purpuric skin lesions, itching, flushing

• Bone pain; may give analgesics; pain usually transient

Perform/provide:

• Storage in light-resistant container at room temp

Evaluate:

• Therapeutic response: decreased tumor size, spread of malignancy

Teach patient/family:

• To use nonhormonal contraception during and for 2 months after discontinuing treatment, pregnancy (D)

• To notify prescriber of stroke: blurred vision, headache, weakness on one side of the body; PE: chest pain, fainting, sweating, difficulty breathing

• To report any complaints, side effects to prescriber; that use may be 5 yr

• To increase fluids to 2 L/day unless contraindicated

• To wear sunscreen, protective clothing, sunglasses

• That vaginal bleeding, pruritus, hot flashes are reversible after discontinuing treatment

• To immediately report decreased visual acuity, which may be irreversible; about need for routine eye exams; that care providers should be told about tamoxifen therapy

• To report vaginal bleeding immediately

• **Tumor flare**—increase in size of tumor, increased bone pain—may occur and will subside rapidly; may take analgesics for pain

• That premenopausal women must use mechanical birth control because ovulation may be induced

• That hair may be lost during treatment; that a wig or hairpiece may make patient feel better; that new hair may be different in color, texture

tamsulosin (Rx)

(tam-sue-lo'sen)

Flomax

Func. class.: Selective α_1-peripheral adrenergic blocker, BPH agent

Chem. class.: Sulfamoylphenethylamine derivative

Do not confuse:

Flomax/Fosamax/Volmax

ACTION: Binds preferentially to α_{1A}-adrenoceptor subtype, which is located mainly in the prostate

USES: Symptoms of benign prostatic hyperplasia (BPH)

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (B), breastfeeding, children, hepatic disease, CAD, severe renal disease, prostate cancer; cataract surgery (floppy iris syndrome)

T

DOSAGE AND ROUTES

• **Adult: PO** 0.4 mg/day increasing to 0.8 mg/day if required after 2-4 wk
Available forms: Caps 0.4 mg
Administer:
• Without regard to food
• Swallow caps whole; do not break, crush, or chew
• Give ½ hr after same meal each day
• If treatment is interrupted for several days, restart at lowest dose (0.4 mg/day)

SIDE EFFECTS

CNS: *Dizziness, headache,* asthenia, insomnia
CV: Chest pain, orthostatic hypotension
EENT: Amblyopia, floppy iris syndrome
GI: Nausea, diarrhea, dysgeusia
GU: Decreased libido, abnormal ejaculation, priapism
INTEG: Rash, pruritus, urticaria
MS: Back pain
RESP: Rhinitis, pharyngitis, cough
SYST: Angioedema

PHARMACOKINETICS

Peak 4-5 hr, duration 9-15 hr, half-life 9-13 hr, metabolized in liver, excreted via urine, extensively protein bound (98%)

INTERACTIONS

Increase: B/P—prazosin, terazosin, doxazosin, α-blockers, vardenafil
Increase: toxicity—cimetidine

NURSING CONSIDERATIONS

Assess:
• **Prostatic hyperplasia:** change in urinary patterns at baseline and throughout treatment; I&O ratios, weight daily; edema; report weight gain or edema
• **Orthostatic hypotension:** monitor B/P, standing, sitting
Perform/provide:
• Storage in tight container in cool environment
Evaluate:
• Therapeutic response: decreased symptoms of benign prostatic hyperplasia
Teach patient/family:
• Not to drive or operate machinery for 4 hr after 1st dose or after dosage increase
• To continue to take even if feeling better
• To advise providers of all products, herbs taken
• To make position changes slowly because orthostatic hypotension may occur
• To take 1/2 hr before same meal each day
• To teach about priapism (rare)
• Not to crush, break, chew

tapentadol (Rx)

(ta-pen'ta-dol)

Nucynta, Nucynta ER

Func. class.: Analgesic, misc.

Chem. class.: μ-Opioid receptor agonist

Controlled Substance Schedule II

ACTION: Centrally acting synthetic analgesic; μ-opioid agonist activity is thought to result in analgesia; inhibits norepinephrine uptake

USES: Moderate to severe pain, diabetic peripheral neuropathy

CONTRAINDICATIONS: Hypersensitivity, asthma, ileus, respiratory depression

Black Box Warning: Respiratory depression

Precautions: Pregnancy (C), breastfeeding, children <18 yr, increased intracranial pressure, MI (acute), severe heart disease, respiratory depression, renal/hepatic disease, GI obstruction, ulcerative colitis, sleep apnea, seizure disorder

Black Box Warning: Accidental exposure, avoid ethanol, substance abuse

DOSAGE AND ROUTES

• **Adult: PO** 50-100 mg q4-6hr, may give 2nd dose ≥1 hr after 1st dose, max 700 mg on day 1, max 600 mg/day thereafter; ext rel 50 mg q12hr (opioid-naive), titrate to 100-250 mg q12hr, max 250 mg q12hr

Available forms: Tabs 50, 75, 100 mg; tabs ext rel 50, 100, 150, 200, 250 mg

Administer:

• With antiemetic if nausea, vomiting occur

• When pain is beginning to return; determine dosage interval by response

• Do not crush, chew, break, or use with alcohol, ext rel product

SIDE EFFECTS

CNS: *Drowsiness, dizziness, confusion, headache, euphoria,* hallucinations, restlessness, syncope, anxiety, flushing, psychological dependence, insomnia, lethargy, tremor, seizures

CV: Palpitations, bradycardia, hypo/hypertension, orthostatic hypotension, sinus tachycardia

GI: *Nausea, vomiting, anorexia, constipation, cramps,* gastritis, dyspepsia, biliary spasms

GU: Urinary retention/frequency

INTEG: *Rash,* urticaria, diaphoresis, pruritus

RESP: Respiratory depression, cough

SYST: Anaphylaxis, infection, serotonin syndrome

PHARMACOKINETICS

Bioavailability 32%, extensively metabolized by liver, excreted in urine 99%, terminal half-life 4 hr, protein binding 20%

INTERACTIONS

Increase: effects with other CNS depressants—alcohol, opioids, sedative/hypnotics, antipsychotics, skeletal muscle relaxants

Increase: toxicity—MAOIs

Increase: serotonin syndrome—SSRIs, SNRIs, serotonin-receptor agonists, tricyclics

Drug/Herb

Increase: sedative effect—kava, St. John's wort, valerian

NURSING CONSIDERATIONS

Assess:

• **Pain:** intensity, location, type, characteristics; need for pain medication by pain/sedation scoring; physical dependence

• I&O ratio; check for decreasing output; may indicate urinary retention

• CNS changes: dizziness, drowsiness, hallucinations, euphoria, LOC, pupil reaction

⚠ **Serotonin syndrome:** increased heart rate, shivering, sweating, dilated pupils, tremors, high B/P, hyperthermia, headache, confusion; if these occur, stop product, administer serotonin antagonist if needed

• Allergic reactions: rash, urticaria, anaphylaxis

Black Box Warning: Respiratory dysfunction: respiratory depression, character, rate, rhythm; notify prescriber if respirations are <10/min; B/P, pulse

Perform/provide:

• Storage in light-resistant area at room temp

• Assistance with ambulation

• Safety measures: nightlight, call bell within easy reach

Evaluate:

• Therapeutic response: decrease in pain

Teach patient/family:

• To report any symptoms of CNS changes, allergic reactions, seizures, serotonin syndrome

• That physical dependency may result from extended use

• That withdrawal symptoms may occur: nausea, vomiting, cramps, fever, faintness, anorexia

• To avoid CNS depressants, alcohol

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- To avoid driving, operating machinery if drowsiness, dizziness occur
- To change positions slowly to decrease orthostatic hypotension
- To notify prescriber if pregnancy planned, suspected or if breastfeeding

telaprevir

Incivek

Func. class.: Antivirals, antihepatitis agent

Chem. class.: NS3/4A protease inhibitor

ACTION: Prevents hepatitis C viral (HCV) replication by blocking the proteolytic activity of HCV NS3/4A serine protease; hepatitis C virus NS3/4A serine protease is an enzyme responsible for the conversion of HCV encoded polyproteins to mature/functioning viral proteins. These proteins (NS4A, NS4B, NS5A, NS5B) are needed for viral replication.

USES: Chronic hepatitis C

CONTRAINDICATIONS: Pregnancy (X) in combination, male partners of women who are pregnant

Precautions: Breastfeeding, neonates, infants, children, adolescents <18 years of age, anemia, neutropenia, thrombocytopenia, HIV, hepatitis B, decompensated hepatic disease, liver or other organ transplants, serious rashes

DOSAGE AND ROUTES

Chronic hepatitis C infection (genotype 1) in compensated liver disease without cirrhosis who are previously untreated or have relapsed after treatment with interferon and ribavirin therapy

- **Adults:** PO 750 mg tid (q7-9 hr) with peginterferon alfa and ribavirin; duration is determined by patient's HCV RNA level at treatment wk 4, 12; if the HCV RNA is undetectable at wk 4, 12, give three-drug regimen for 12 wk then give an additional 12 wk of only peginterferon alfa and ribavirin (24 wk total); if the HCV RNA is detectable but #1000 international units/ml at wk 4 or 12, give three-drug regimen × 12 wk then an additional 36 wk of only peginterferon alfa and ribavirin (48 wk total)

Without cirrhosis who are previously partial or null responders to interferon and ribavirin therapy/or those with cirrhosis:

- **Adults:** PO 750 mg tid (q7-9 hr) with peginterferon alfa and ribavirin; give three-drug regimen × 12 wk then another 36 wk (48 wk total) of only peginterferon alfa and ribavirin

Available forms: Tab 375 mg

Administer:

- Only use in combination with peginterferon alfa and ribavirin; never give as monotherapy

⚠ Discontinue in all patients with hepatitis C virus RNA concentrations ≥1000 IU/ml at wk 4 or 12 or a confirmed detectable HCV RNA concentration at wk 24

⚠ Any contraindication to peginterferon alfa or ribavirin also applies to this product; see ribavirin or peginterferon alfa monographs for additional information regarding contraindications and warning associated with these products

- For relief of mild to moderate rashes, give oral antihistamines and/or topical corticosteroids; treatment with systemic steroids is not recommended
- Give with food, not low-fat

SIDE EFFECTS

CNS: Fatigue

GI: Hemorrhoids, anorectal discomfort, pruritus ani, rectal burning, nausea, diarrhea, vomiting, dysgeusia, hyperbilirubinemia

HEMA: Anemia, decreased Hgb, lymphopenia, leukopenia, neutropenia, thrombocytopenia

INTEG: Drug reaction with eosinophilia, and systemic symptoms (DRESS), Ste-

vens-Johnson Syndrome (SJS), rash, pruritus, severe rashes (bullous rash, vesicular rash, and skin ulcerations)
META: Increased uric acid

PHARMACOKINETICS

59%-76% plasma protein binding, primarily to α 1-acid glycoprotein and albumin; metabolized extensively in liver by hydrolysis, oxidation, reduction by CYP3A4; excreted in feces (82%), exhaled (9%), excreted in urine (1%); elimination half life 4-4.7 hr; steady state half life 9-11 hr, peak 4-5 hr; food increases effect; steady state is reduced by 15% in mild hepatic disease, 46% in moderate hepatic disease (Child-Pugh class B)

INTERACTIONS

Increase: life-threatening reactions of each product—alfuzosin, ergots (dihydroergotamine, ergotamine, ergonovine, methylergonovine), cisapride, pimozide, lovastatin, simvastatin, ezetimibe, niacin with simvastatin and boceprevir; triazolam, oral midazolam; sildenafil, tadalafil (pulmonary arterial hypertension); do not use concurrently

Increase: effect and adverse reactions of each product—phosphodiesterase type 5 (PDE5) inhibitors (for erectile dysfunction), atorvastin, lidocaine, atorvastatin, amiodarone, bepridil, flecainide, propafenone, quiNIDine, digoxin, ketoconazole, itraconazole, posaconazole, voriconazole, desipramine, traZODone, erythromycin, clarithromycin, telithromycin, rifabutin, dexamethasone, felodipine, niCARdipine, NIFEdipine, budesonide, bosentan, warfarin, astemizole, boceprevir, bupivacaine, busPIRone, cevimeline, chloroquine, cilostazol, cinacalcet, clomipramine, clonazePAM, clopidogrel, cloZAPine, cyclobenzaprine, dapsone, dextromethorphan, diazepam, diclofenac, disopyramide, disulfiram, dolasetron, donepezil, colchicine, cycloSPORINE, tacrolimus, sirolimus, buprenorphine, salmeterol, vardenafil, ALPRAZolam, citalopram, amLODIPine, diltiazem, nisoldipine, verapamil, systemic corticosteroids, acetaminophen, alfentanil, aliskiren, almotriptan, alosetron, ARIPiprazole, dutasteride, ebastine, eplerenone, erlotinib, omeprazole, estazolam, eszopiclone, ethosuximide, exemestane, finasteride, flunitrazepam, flurazepam, galantamine, gefitinib, granisetron, halofantrine, haloperidol, HYDROcodone, ifosfamide, imipramine, indiplon, isradipine, ivermectin, ixabepilone, losartan, meloxicam, mirtazapine, montelukast, nateglinide, oxybutynin, oxyCODONE, palonosetron, paricalcitol, prasugrel, praziquantel, quazepam, QUEtiapine, quinacrine, ramelteon, repaglinide, ropivacaine, selegiline, sibutramine, sitaxsentan, solifenacin, SUFentanil, SUNItinib, theophylline, aminophylline, tiaGABine, tinidazole, tolterodine, traMADol, venlafaxine, amitriptyline, carvedilol, DAUNOrubicin, loratadine, desloratadine, lansoprazole, dexlansoprazole, DOCEtaxel, DOXOrubicin, droperidol, eletriptan, etoposide, fentaNYL, fexofenadine, glyburide, irinotecan, loperamide, maraviroc, mefloquine, mitoMYcin, morphine, nortriptyline, ondansetron, PACLitaxel, plicamycin, risperiDONE, sertraline, silodosin, teniposide, terfenadine, testosterone, tolvaptan, vinBLAStine, vinCRIStine and others; use cautiously, may need to reduce dose

Increase: hyperkalemia—drospirenone

Decrease: estrogen levels—ethinyl estradiol

Decrease: telaprevir effect—CYP3A4 inhibitors (phenytoin, carBAMazepine, PHENobarbital, rifampin)

Decrease: effect of—methadone

Possible treatment failure: efavirenz, ritonavir, atazanavir, lopinavir with ritonavir

Drug/Herb

Do not use with St. John's wort

T

NURSING CONSIDERATIONS

Assess:

⚠ **Pregnancy:** pregnancy (X) combination therapy; obtain a pregnancy test before, monthly during, and for 6 months after treatment is completed; those who are not willing to practice strict contraception should not receive treatment with these products; report any cases of prenatal ribavirin exposure to the Ribavirin Pregnancy registry at (800) 593-2214

⚠ **Anemia:** monitor hemoglobin before, at treatment wk 4, 8, 12, and as needed; if Hgb is <10 g/dL, decrease ribavirin dosage; if Hgb is <8.5 g/dL, discontinuation of therapy is recommended; telaprevir dosage should not be altered based on adverse reactions; anemia may be managed through ribavirin dose modifications; never alter the dose of telaprevir; if anemia persists despite a reduction in ribavirin dose, consider discontinuing telaprevir; if management of anemia requires permanent discontinuation of ribavirin, treatment with telaprevir must also be permanently discontinued; once telaprevir has been discontinued, it must not be restarted; monitor CBC with differential at treatment wk 4, 8, 12, and at other treatment points

⚠ **Stevens-Johnson syndrome:** eosinophilia, fever, mucosal skin erosion, mucosal ulceration, target lesions; if serious skin reaction occurs, immediately discontinue all components of the three-drug regimen and refer the patient for urgent medical care

• Thyroid function tests, LFTs, serum bilirubin/creatinine, BUN, bilirubin, serum electrolytes, serum uric acid, baseline and periodically during treatment

Perform/provide:

• Storage of tablet at room temperature

Evaluate:

• Decreasing hepatitis C viral infection

Teach patient/family:

⚠ To use two forms of effective contraception (intrauterine devices and barrier methods) during treatment and for 6 months after treatment (pregnancy category X), not to breastfeed

⚠ That if a serious skin reaction occurs, to seek urgent medical care; all components of the triple-drug regimen must be discontinued immediately

telavancin (Rx)

(tel-a-van'sin)

Vibativ

Func. class.: Antiinfective, miscellaneous

Chem. class.: Lipoglycopeptide

ACTION: Inhibits bacterial cell wall synthesis, blocks glycopeptides

USES: Skin/skin-structure infections caused by *Enterococcus faecalis, E. faecium, Staphylococcus aureus* (MSRA), *S. aureus* (MSSA), *S. epidermidis, S. haemolyticus, Streptococcus agalactiae* (group B), *S. dysgalactiae, S. pyogenes* (group A β-tremolytic), *S. anginosus, S. intermedius, S. constellates*

Unlabeled uses: Nosocomial pneumonia caused by susceptible gram-positive bacteria

CONTRAINDICATIONS: Hypersensitivity

Precautions: Breastfeeding, children, geriatric patients, renal disease, antimicrobial resistance, diabetes mellitus, diarrhea, GI disease, heart failure, hypertension, pseudomembranous colitis, QT prolongation, vancomycin hypersensitivity

Black Box Warning: Pregnancy (C), females

DOSAGE AND ROUTES

• **Adult: IV INF** 10 mg/kg over 60 min q24hr × 7-14 days

Nosocomial pneumonia (unlabeled)

• **Adult: IV INF** 10 mg/kg q24hr × 7-21 days

Available forms: Lyophilized powder for inj 250, 750 mg

Administer:

- Use only for susceptible organisms to prevent drug-resistant bacteria
- Antihistamine if red-man syndrome occurs: decreased B/P; flushing of neck, face

Intermittent IV INF route

- After reconstitution with 15 ml D_5W sterile water for inj; 0.9% NaCl (15 mg/ml) 250-mg vial; add 45 ml to 750-mg vial (15 mg/ml) for dose of 150-800 mg; further dilute with 100-250 ml of compatible sol; for dose <150 mg or >800 mg, further dilute to conc of 0.6-8 mg/ml with compatible sol; give over 60 min; reconstituted or diluted sol is stable for 4 hr room temperature, 7 hr refrigerated

SIDE EFFECTS

CNS: Anxiety, chills, flushing, headache, insomnia

CV: QT prolongation, irregular heartbeat

EENT: Hearing loss

GI: Nausea, vomiting, pseudomembranous colitis, abdominal pain, constipation, diarrhea, metallic taste

GU: Nephrotoxicity, *increased BUN, creatinine,* renal failure, foamy urine

HEMA: Leukopenia, eosinophilia, anemia, thrombocytopenia

INTEG: Chills, fever, rash, thrombophlebitis at inj site; urticaria, pruritus, necrosis (red-man syndrome)

SYST: Anaphylaxis, superinfection

PHARMACOKINETICS

Onset rapid, half-life 8-9 hr, excreted in urine (76%), protein binding 90%

INTERACTIONS

Increase: otoxicity or nephrotoxicity—aminoglycosides, cephalosporins, colistin, polymyxin, bacitracin, CISplatin, amphotericin B, nondepolarizing muscle relaxants, cidofovir

Increase: QT prolongation—class IA, III antidysrhythmics; some phenothiazines; chloroquine, clarithromycin, droperidol, dronedarone, erythromycin, haloperidol, levomethadye, methadone, pimozide, ziprasidone

Drug/Lab Test

False increase: INR, PT, PTT

NURSING CONSIDERATIONS

Assess:

- **Infection:** WBC, urine, stools, sputum, characteristics of wound throughout treatment C&S
- I&O ratio; report hematuria, oliguria; nephrotoxicity may occur

Black Box Warning: Obtain a pregnancy test before use; if a woman has taken this product during pregnancy, the national registry should be notified at 866-658-4228

- Auditory function during, after treatment; hearing loss; ringing, roaring in ears; product should be discontinued
- B/P during administration; sudden drop may indicate red-man syndrome; also flushing, pruritus, rash
- Respiratory status: rate, character, wheezing, tightness in chest
- Allergies before treatment, reaction to each medication

Perform/provide:

- EPINEPHrine, suction, tracheostomy set, endotracheal intubation equipment on unit; anaphylaxis may occur
- Adequate intake of fluids (2 L/day) to prevent nephrotoxicity

Evaluate:

- Therapeutic response: negative culture

Teach patient/family:

- About all aspects of product therapy; that culture may be taken after completed course of medication
- To report sore throat, fever, fatigue; could indicate superinfection; diarrhea **(pseudomembranous colitis)**
- To use contraception while taking this product, do not breastfeed

T

telbivudine (Rx)

(tel-bi'vyoo-deen)

Sebivo ♣, Tyzeka

Func. class.: Antiretroviral

Chem. class.: Nucleoside reverse transcriptase inhibitor (NRTI)

ACTION: Inhibits replication of HBV DNA polymerase, which inhibits HBV replication

USES: Treatment of chronic hepatitis B

CONTRAINDICATIONS: Hypersensitivity, breastfeeding

Precautions: Pregnancy (B), children, severe renal disease, anemia, organ transplant, dialysis, HIV, obesity, alcoholism; Hispanic or African descendents (safety not established)

Black Box Warning: Impaired hepatic function, lactic acidosis

DOSAGE AND ROUTES

- **Adult and adolescent >16 yr: PO** 600 mg/day; max 600 mg/day

Renal dose

- **Adult: PO** CCr 30-49 ml/min, 600 mg tab q48hr or 400 mg oral sol daily; CCr <30 ml/min (not requiring dialysis), 600 mg tab q72hr or 200 mg oral sol daily

Available forms: Tabs 600 mg

Administer:

- With/without food with a full glass of water

SIDE EFFECTS

CNS: *Fever, headache, malaise,* weakness, *dizziness, insomnia*

EENT: Taste change, hearing loss, photophobia

GI: *Nausea, vomiting, diarrhea, anorexia,* abdominal pain, hepatomegaly

INTEG: *Rash*

MISC: Lactic acidosis

MS: Myalgia, arthralgia, muscle cramps

RESP: Cough

PHARMACOKINETICS

Excreted by kidneys (unchanged), steady state 5-7 days, protein binding 3.3%, terminal half-life 40-49 hr, peak 1-4 hr

INTERACTIONS

- Altered telbivudine levels: any agent altering renal function
- Do not use with pegylated interferon α-2a

Increase: myopathy risk possible—HMG-CoA reductase inhibitors, fibric acid derivatives, penicillamine, zidovudine, ZDV, cycloSPORINE, erythromycin, niacin, azole antifungals, corticosteroids, hydrochloroquine

NURSING CONSIDERATIONS

Assess:

Black Box Warning: LFTs, hepatitis B serology, creatine kinase, periodically, monitor HBV DNA after 24 wk; if viral suppression incomplete (≥300 copies/ml), start alternate therapy; monitor HBV DNA q6mo

Black Box Warning: Lactic acidosis: obtain baseline liver function tests; if elevated, discontinue treatment; discontinue even if liver function tests normal but lactic acidosis, hepatomegaly present, may be fatal

Perform/provide:

- Storage at room temp

Evaluate:

- Therapeutic response: decreasing hepatitis B serology

Teach patient/family:

- That GI complaints and insomnia may resolve after 3-4 wk of treatment
- That product does not cure hepatitis B and does not stop its spread to others
- That follow-up visits must be continued
- That serious product interactions may occur if OTC products are ingested; to check with prescriber before taking

• That product may cause dizziness; to avoid hazardous activities until response is known
• To report symptoms of cough, difficulty sleeping, excessive headache, muscle pain/weakness

telmisartan (Rx)

(tel-mih-sar'tan)

Micardis

Func. class.: Antihypertensive
Chem. class.: Angiotensin II receptor (Type AT_1) antagonist

ACTION: Blocks the vasoconstricting and aldosterone-secreting effects of angiotensin II; selectively blocks the binding of angiotensin II to the AT_1 receptor found in tissues

USES: Hypertension, alone or in combination; stroke, MI prophylaxis (>55 yr) in patients unable to take ACE inhibitors
Unlabeled uses: Heart failure

CONTRAINDICATIONS: Hypersensitivity

Black Box Warning: Pregnancy (D) 2nd/3rd trimesters

Precautions: Pregnancy (C) 1st trimester, breastfeeding, children, geriatric patients; hypersensitivity to ACE inhibitors; renal/hepatic disease, renal artery stenosis, dialysis, CHF, hyperkalemia, hypotension, hypovolemia

DOSAGE AND ROUTES

• **Adult: PO** 40 mg/day; range 20-80 mg/day
Stroke, MI prophylaxis
• **Adult >55 yr: PO** 80 mg/day
Available forms: Tabs 20, 40, 80 mg
Administer:
• Without regard to meals
• Increased dose to African American patients or consider alternative agent; B/P response may be reduced

SIDE EFFECTS

CNS: Dizziness, insomnia, *anxiety,* headache, fatigue
GI: Diarrhea, dyspepsia, *anorexia, vomiting*
MS: Myalgia, pain
RESP: Cough, *upper respiratory infection,* sinusitis, pharyngitis

PHARMACOKINETICS

Onset of antihypertensive activity 3 hr, peak 0.5-1 hr, extensively metabolized, terminal half-life 24 hr, protein binding 99.5%, excreted in feces >97%, B/P response is less in African American patients

INTERACTIONS

Increase: digoxin peak/trough concentrations—digoxin
Increase: antihypertensive action—diuretics, other antihypertensives, NSAIDs
Increase: hyperkalemia—potassium-sparing diuretics, potassium salt substitutes
Decrease: antihypertensive effect—NSAIDs, salicylates
Drug/Lab Test
Increase: LFTs

NURSING CONSIDERATIONS

Assess:
• B/P, pulse standing, lying; note rate, rhythm, quality; if severe hypotension occurs, place in supine position and give IV NS
• Baselines of renal, hepatic studies before therapy begins
• **CHF:** edema in feet, legs daily; jugular venous distention; dyspnea, crackles
Evaluate:
• Therapeutic response: decreased B/P
Teach patient/family:
• To comply with dosage schedule, even if feeling better; to take at same time of day; that therapeutic effect may take 2-4 wk
• To notify prescriber of mouth sores, fever, swelling of hands or feet, irregular

T

heartbeat, chest pain, decreased urine output

- That excessive perspiration, dehydration, vomiting, diarrhea may lead to fall in blood pressure; to consult prescriber if these occur
- That product may cause dizziness, fainting, lightheadedness

Black Box Warning: To notify prescriber if pregnancy is planned or suspected, pregnancy category (D) 2nd/3rd trimester

- To notify prescriber of all prescriptions, OTC products, and supplements taken
- **Overdose:** dizziness, bradycardia or tachycardia

temazepam (Rx)

(te-maz'e-pam)

Restoril

Func. class.: Sedative/hypnotic

Chem. class.: Benzodiazepine, short to intermediate acting

Controlled Substance Schedule IV (USA), Schedule F (Canada)

Do not confuse:
temazepam/flurazepam

ACTION: Produces CNS depression at limbic, thalamic, hypothalamic levels of the CNS; may be mediated by neurotransmitter γ-aminobutyric acid (GABA); results are sedation, hypnosis, skeletal muscle relaxation, anticonvulsant activity, anxiolytic action

USES: Insomnia, short-term treatment (generally 7-10 days)

CONTRAINDICATIONS: Pregnancy (X), breastfeeding, hypersensitivity to benzodiazepines, intermittent porphyria

Precautions: Children <15 yr, geriatric patients, anemia, renal/hepatic disease, suicidal individuals, drug abuse, psychosis, acute closed-angle glaucoma, seizure disorders, angioedema, sleep-related behaviors (sleepwalking), pulmonary disease

DOSAGE AND ROUTES

- **Adult: PO** 7.5 to 30 mg at bedtime
- **Geriatric: PO** 7.5 mg at bedtime

Available forms: Caps 7.5, 15, 22.5, 30 mg

Administer:

- ½-1 hr before bedtime for sleeplessness
- On empty stomach for fast onset; may be taken with food if GI symptoms occur
- Avoid use with CNS depressants; serious CNS depression may result

SIDE EFFECTS

CNS: *Lethargy, drowsiness, daytime sedation,* dizziness, confusion, lightheadedness, headache, anxiety, irritability, complex sleep-related reactions (sleep driving, sleep eating), fatigue

CV: Chest pain, pulse changes, hypotension

EENT: Blurred vision

GI: Nausea, vomiting, diarrhea, heartburn, abdominal pain, constipation, anorexia

SYST: Severe allergic reactions

PHARMACOKINETICS

Onset 30 min, peak 1-2 hr, duration 6-8 hr, half-life 10-20 hr, metabolized by liver, excreted by kidneys, crosses placenta, excreted in breast milk, 98% protein binding

INTERACTIONS

Increase: effects of cimetidine, disulfiram, oral contraceptives

Increase: action of both products—alcohol, CNS depressants

Increase: effect of temazepam—probenecid

Decrease: effect of antacids, theophylline, rifampin

Drug/Herb
Increase: CNS depression—hops, kava, valerian, chamomile, skullcap
Drug/Food
Decrease: temazepam effect—caffeine
Drug/Lab Test
Increase: ALT, AST

NURSING CONSIDERATIONS

Assess:
- Mental status: mood, sensorium, affect, memory (long, short), orientation
- Type of sleep problem: falling asleep, staying asleep, baseline, periodically
- **Dependency:** restrict amount given to patient, assess for physical/psychological dependency; high-level risk for abuse

Perform/provide:
- Assistance with ambulation after receiving dose
- Storage in tight container in cool environment

Evaluate:
- Therapeutic response: ability to sleep at night, decreased early morning awakening if taking product for insomnia

Teach patient/family:
- To avoid driving, other activities requiring alertness until stabilized
- To avoid alcohol ingestion, other CNS depressants
- That effects may take 2 nights for benefits to be noticed
- To limit to 7-10 days of continuous use
- About alternative measures to improve sleep: reading, exercise several hours before bedtime, warm bath, warm milk, TV, self-hypnosis, deep breathing
- Not to discontinue abruptly, withdraw gradually
- That complex sleep-related behaviors may occur: sleep driving/eating
- That hangover, memory impairment are common in geriatric patients but less common than with barbiturates

⚠ To notify prescriber if pregnancy is planned or suspected, pregnancy (X); to use contraception while taking this product

TREATMENT OF OVERDOSE:

Lavage, activated charcoal; monitor electrolytes, VS

temozolomide (Rx)

(tem-oh-zole'oh-mide)

Temodar

Func. class.: Antineoplastic-alkylating agent

Chem. class.: Imidazotetrazine derivative

ACTION:

Prodrug that undergoes conversion to MTIC; MTIC action prevents DNA transcription

USES:

Anaplastic astrocytoma with relapse, glioblastoma multiforme, malignant glioma
Unlabeled uses: Metastatic melanoma

CONTRAINDICATIONS:

Pregnancy (D), breastfeeding; hypersensitivity to this product, carbazine, or gelatin
Precautions: Geriatric patients, radiation therapy, renal/hepatic disease, bone marrow suppression, infection, myelosuppression

DOSAGE AND ROUTES

Anaplastic astrocytoma
- **Adult: PO** adjust dose based on nadir neutrophil and platelet counts 150 mg/m²/day × 5 days during a 28-day cycle

Glioblastoma multiforme
- **Adult: PO/IV** 75 mg/m²/day × 42 days with focal radiotherapy then maintenance of 6 cycles

Malignant glioma
- **Adult: IV** 150 mg/m²/day over 90 min on days 1-5 q28days, may increase to 200 mg/m²/day on days 1-5 q28days if hematologic parameters permit

Available forms: Caps 5, 20, 100, 140, 180, 250 mg; powder for inj 100 mg

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Administer:

PO route

- Do not break, crush, chew, open caps
- Antiemetic 30-60 min before product to prevent vomiting
- Caps 1 at a time with 8 oz of water at same time of day
- Fluids IV or PO before chemotherapy to hydrate patient
- If caps accidentally damaged, do not allow contact with skin or inhale
- Use proper procedures for handling/disposing of chemotherapy products
- Give on empty stomach at bedtime to prevent nausea/vomiting

IV route

- Bring vial to room temp, discard if cloudy
- Inject 41 ml sterile water for inj into vial (2.5 mg/ml)
- Gently swirl, do not shake

Intermittent IV INF route

- Withdraw up to 40 ml from each vial to make total dose, transfer to empty 250-ml PVC inf bag, flush before and after inf
- Run over 90 min
- Use reconstituted sol within 14 hr, including inf time
- Do not admix

SIDE EFFECTS

CNS: Seizures, *hemiparesis, dizziness, poor coordination, amnesia, insomnia, paresthesia, somnolence, paresis, ataxia, anxiety, dysphagia, depression, confusion*

GI: *Nausea, anorexia, vomiting,* abdominal pain, constipation

GU: Urinary incontinence, UTI, frequency

HEMA: Thrombocytopenia, leukopenia, anemia, myelosuppression, neutropenia

INTEG: *Rash, pruritus*

MISC: Headache, fatigue, asthenia, fever, edema, back pain, weight increase, diplopia

RESP: URI, pharyngitis, sinusitis, coughing

SYST: Anaphylaxis, secondary malignancy

PHARMACOKINETICS

Absorption complete, rapid; crosses blood-brain barrier; excreted in urine, feces; half-life 1.8 hr; peak 1 hr

INTERACTIONS

- Do not use within 24 hr of sargramostim, filgrastim, G-CSF

Increase: myelosuppression—radiation, other antineoplastics

Increase: bleeding risk—NSAIDs, anticoagulants, platelet inhibitors, thrombolytics

Decrease: antibody reaction—live virus vaccines, toxoids

Decrease: action of digoxin

Drug/Food

Decrease: drug absorption

Drug/Lab Test

Decrease: Hgb, platelets, WBC, neutrophils

NURSING CONSIDERATIONS

Assess:

- Tumor response during treatment
- CBC on day 22 (21 days after 1st dose), CBC weekly until recovery if ANC is $<1.5 \times 10^9$/L and platelets $<100 \times 10^9$/L, do not administer to patients who do not tolerate 100 mg/m^2, myelosuppression usually occurs late during the treatment cycle
- Seizures throughout treatment; mental status
- Monitor temp; may indicate beginning infection
- Hepatic studies before, during therapy (bilirubin, AST, ALT, LDH), as needed or monthly
- Bleeding: hematuria, guaiac, bruising, petechiae, mucosa or orifices

Perform/provide:

- Storage in light-resistant container in a dry area

Evaluate:

- Therapeutic response: decreased tumor size, spread of malignancy

Teach patient/family:

- To report signs of infection: fever, sore throat, flulike symptoms

• To report signs of anemia: fatigue, headache, faintness, SOB, irritability
• To report bleeding; to avoid use of razors, commercial mouthwash
• To notify prescriber if pregnancy is planned or suspected, pregnancy (D); not to breastfeed

temsirolimus (Rx)

(tem-sir-oh'li-mus)

Torisel

Func. class.: Biologic response modifier

Chem. class.: Kinase inhibitor, mTOR antagonist

ACTION: Inhibits mammalian target of rapamycin (mTOR), a protein kinase

USES: Renal cell carcinoma
Unlabeled uses: Mantle cell lymphoma, relapsed/refractory high-grade malignant gliomas, neuroblastoma, rhabdomyosarcoma in children

CONTRAINDICATIONS: Pregnancy (D), breastfeeding; hypersensitivity to this product or to sirolimus; polysorbate 80
Precautions: Children <13 yr, females, severe pulmonary/renal/hepatic disease (bilirubin >1-1.5×ULN or AST >ULN but bilirubin ≤ULN), diabetes mellitus, hyperkalemia, hyperuricemia, hypertension, bone marrow suppression, hypertriglyceridemia/hyperlipidemia, surgery, brain tumors

DOSAGE AND ROUTES

• **Adult: IV** 25 mg over 30-60 min weekly; treat until disease progression or severe toxicity occurs

Hepatic dose

• **Adult: IV** (mild impairment) bilirubin >1-1.5×ULN or AST >ULN but bilirubin ≤ULN; reduce to 15 mg/wk; (moderate or severe impairment, do not use)

Available forms: 25 mg/ml sol for inj kit

Administer:

• Using in-line filter ≤5 microns and inf pump
• Premedicate with 25-50 mg diphenhydrAMINE IV 30 min before dose; if reaction occurs, stop for ½-1 hr, may resume at slower rate
• Over 30-60 min, complete inf within 6 hr
• Dilute product with 1.8 ml provided diluent, result is 3 ml (10 mg/ml); invert to mix well; withdraw required amount and inject rapidly into 250 ml of NS; do not use PVC inf bags/sets
• Protect from light during preparation, use only glass

SIDE EFFECTS

CNS: *Headache*, seizures
CV: Hypertension, thrombophlebitis
ENDO: Hypertriglyceridemia, hyperlipidemia, hyperglycemia
GI: Nausea, vomiting, diarrhea, constipation, bowel perforation
GU: UTIs, albuminuria, hematuria, proteinuria, renal failure, mucositis
HEMA: Anemia, leukopenia, thrombocytopenia
INTEG: *Rash*, pruritus
META: Metabolic acidosis, hyperglycemia, hyperlipidemia
RESP: Interstitial lung disease
SYST: Lymphoma

PHARMACOKINETICS

Rapidly absorbed, peak 0.5-2 hr, extensively metabolized via liver by P450 3A4, eliminated via feces

INTERACTIONS

Increase: blood levels—CYP3A4 inhibitors, antifungals, calcium channel blockers, cimetidine, clarithromycin, danazol, erythromycin, cycloSPORINE, metoclopramide, bromocriptine, HIV-protease inhibitors, benzodiazepines, HMG-CoA reductase inhibitors
Increase: toxicity—SUNItinib

T

Decrease: blood levels—CYP3A4 inducers, carBAMazepine, dexamethasone, PHENobarbital, phenytoin, rifamycin, rifapentine
Decrease: effect of vaccines—avoid with vaccines
Drug/Herb
Decrease: sirolimus effect—St. John's wort
Increase: effect—ginseng, maitake, mistletoe
Decrease: immunosuppression—astragalus, echinacea, melatonin
Drug/Food
• Alters bioavailability; use consistently with/without food; do not use with grapefruit juice

NURSING CONSIDERATIONS

Assess:
• Cardiac status: B/P, heart rate
• Interstitial lung disease
• Hypersensitivity reactions: anaphylaxis
• Lipid profile: cholesterol, triglycerides; lipid-lowering agent may be needed; blood glucose
⚠ Infection and development of lymphoma
⚠ Blood studies: Hgb, WBC, platelets during treatment monthly
• Renal studies: BUN, creatinine, phosphate potassium; proteinuria, hematuria, albuminemia may indicate renal failure
• **Hepatic disease:** monitor liver function tests at baseline and periodically
Evaluate:
• Therapeutic response: decreased time of progression of renal cell carcinoma
Teach patient/family:
• To report fever, rash, severe diarrhea, chills, sore throat, fatigue; that serious infections may occur; to report clay-colored stools, cramping **(hepatotoxicity)**, excessive thirst, urinary frequency, new or worsening breathing problems, blood in stool, abdominal pain
• To avoid crowds, persons with known infections to reduce risk of infection
⚠ To use contraception before, during, for 12 wk after product discontinued; to avoid breastfeeding; that men should also use reliable contraception during and for 12 wk after cessation of product, pregnancy (D)

⚠ HIGH ALERT

tenecteplase (TNK-tPA) (Rx)

(ten-ek'ta-place)
TNKase
Func. class.: Thrombolytic
Chem. class.: Tissue plasminogen activator

ACTION: Activates conversion of plasminogen to plasmin (fibrinolysin): plasmin breaks down clots (fibrin), fibrinogen, factors V, VII; occlusion of venous access lines

USES: Acute myocardial infarction, coronary artery thrombosis

CONTRAINDICATIONS: Hypersensitivity, arteriovenous malformation, aneurysm, active bleeding, intracranial/intraspinal surgery or trauma within 2 mo, CNS neoplasms, severe hypertension, severe renal/hepatic disease, history of CVA, increased ICP/stroke
Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, arterial emboli from left side of heart, hypocoagulation, subacute bacterial endocarditis, rheumatic valvular disease, cerebral embolism/thrombosis/hemorrhage, intraarterial diagnostic procedure or surgery (10 days), recent major surgery, dysrhythmias, hypertension

DOSAGE AND ROUTES

Total dose, max 50 mg based on patient's weight
• **Adult <60 kg: IV BOL** 30 mg, give over 5 sec
• **Adult ≥60-<70 kg: IV BOL** 35 mg, give over 5 sec

- **Adult ≥70-<80 kg: IV BOL** 40 mg, give over 5 sec
- **Adult ≥80-<90 kg: IV BOL** 45 mg, give over 5 sec
- **Adult ≥90 kg: IV BOL** 50 mg, give over 5 sec, max 50 mg total dose

Available forms: Powder for inj, lyophilized 50 mg

Administer:

Intermittent IV INF route

- As soon as thrombi identified; not useful for thrombi >1 wk old
- Cryoprecipitate or fresh frozen plasma if bleeding occurs
- Heparin after fibrinogen level >100 mg/dl; heparin inf to increase PTT to 1.5-2× baseline for 3-7 days; IV heparin with loading dose is recommended
- Aseptically withdraw 10 ml of sterile water for inj from diluent vial, use red cannula syringe-filling device, inject all contents of syringe into product vial, direct into powder, swirl, withdraw correct dose, discard any unused sol; stand shield with dose vertically on flat surface and passively recap red cannula, remove entire shield assembly by twisting counter-clockwise, give by IV BOL
- IV therapy: use upper-extremity vessel that is accessible to manual compression
- If product not used immediately, refrigerate, use within 8 hr; not compatible with dextrose; flush dextrose-containing lines with saline before and after administration

SIDE EFFECTS

CV: Dysrhythmias, hypotension, pulmonary edema, pulmonary embolism, cardiogenic shock, cardiac arrest, heart failure, myocardial reinfarction, myocardial rupture, tamponade, pericarditis, pericardial effusion, thrombosis, CVA

HEMA: Decreased Hct, bleeding

INTEG: Rash, urticaria, phlebitis at IV inf site, itching, flushing

SYST: GI, GU, intracranial, retroperitoneal bleeding, surface bleeding, anaphylaxis

PHARMACOKINETICS

IV: Onset immediate, half-life 20-24 min metabolized by liver

INTERACTIONS

Increase: bleeding—aspirin, indomethacin, phenylbutazone, anticoagulants, antithrombolytics, glycoprotein IIb/IIIa inhibitors, dipyridamole, clopidogrel, ticlopidine, NSAIDs, cefamandole, cefoperazone, cefoTEtan, SSRIs, SNRIs

Drug/Herb

Increase: risk of bleeding—feverfew, garlic, ginger, ginkgo, green tea, horse chestnut

Drug/Lab Test

Increase: INR, PT, PTT

NURSING CONSIDERATIONS

Assess:

- **Allergy:** fever, rash, itching, chills; mild reaction may be treated with antihistamines
- Cholesterol embolism, blue-toe syndrome, renal failure, MI, cerebral/spinal cord/bowel/retinal infarction, hypertension; can be fatal

⚠ **Bleeding** during 1st hr of treatment; hematuria, hematemesis, bleeding from mucous membranes, epistaxis, ecchymosis; may require tranfusion (rare), continue to assess for bleeding for 24 hr

- Blood studies (Hct, platelets, PTT, PT, TT, aPTT) before starting therapy; PT or aPTT must be <2× control before starting therapy; PTT or PT q3-4hr during treatment
- Hypersensitive reactions: fever, rash, dyspnea; product should be discontinued
- VS, B/P, pulse, respirations, neurologic signs, temp at least q4hr; temp >104° F (40° C) indicates internal bleeding; systolic pressure increase >25 mm Hg should be reported to prescriber

⚠ Neurologic changes that may indicate intracranial bleeding

⚠ Retroperitoneal bleeding: back pain, leg weakness, diminished pulses

Perform/provide:
- Bed rest during entire course of treatment
- Avoidance of venous or arterial puncture, inj, rectal temp, any invasive treatment
- Treatment of fever with acetaminophen or aspirin
- Pressure for 30 sec to minor bleeding sites; inform prescriber if this does not attain hemostasis; apply pressure dressing

Evaluate:
- Therapeutic response: resolution of MI

Teach patient/family:
- About proper dental care to avoid bleeding
- To notify prescriber immediately of sudden, severe headache
- To notify prescriber of bleeding; hypersensitivity; fast, slow, or uneven heart rate; feeling of faintness; blood in urine, stools; nose bleeds

tenofovir (Rx)

(ten-oh-foh'veer)

Viread

Func. class.: Antiretroviral

Chem. class.: Nucleoside reverse transcriptase inhibitor (NRTI)

ACTION: Inhibits replication of HIV virus by competing with the natural substrate and then incorporating into cellular DNA by viral reverse transcriptase, thereby terminating cellular DNA chain

USES: HIV-1 infection with at least 2 other antiretrovirals, hepatitis B

CONTRAINDICATIONS: Hypersensitivity

Black Box Warning: Lactic acidosis

Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, renal disease, CCr <60 ml/min, osteoporosis, immune reconstitution syndrome

Black Box Warning: Hepatic disease, hepatitis

DOSAGE AND ROUTES

- **Adult: PO** 300 mg/day with meal; if used with didanosine, give tenofovir 2 hr before or 1 hr after didanosine
- **Child ≥2 yr: PO** 8 mg/kg daily approximate; ≥35 kg 300 mg daily; 28-34 kg 250 mg daily; 22-27 kg 200 mg daily; 17-21 kg 150 mg daily

Renal dose
- **Adult: PO** CCr 30-49 ml/min, 300 mg q48hr; CCr 10-29 ml/min, 300 mg q72-96hr; CCr <10 ml/min, not recommended

Available forms: Tabs 150, 200, 250, 300 mg; oral powder 40 mg/scoop

Administer:
- Without regard to food
- 2 hr before or 1 hr after didanosine (if used)
- **Oral powder:** use scoop provided, mix powder into 2-4 oz (¼-½ cup) of applesauce, yogurt, do not mix with liquid, product is bitter, use immediately after mixing, clean scoop

SIDE EFFECTS

CNS: *Headache, asthenia*
GI: *Nausea, vomiting, diarrhea,* anorexia, *flatulence, abdominal pain,* pancreatitis
GU: Renal failure, renal tubular acidosis/necrosis, Fanconi syndrome
HEMA: Neutropenia, osteopenia
INTEG: *Rash,* angioedema
META: Lactic acidosis, hypokalemia, hypophosphatemia
MS: Myopathy, rhabdomyolysis
SYST: Lipodystrophy

PHARMACOKINETICS

Rapidly absorbed, distributed to extravascular space, excreted unchanged in urine 70%-80%, terminal half-life 17 hr, peak 1-2 hr

INTERACTIONS

Increase: tenofovir level—cidofovir, acyclovir, valacyclovir, ganciclovir, valganciclovir

Increase: level of didanosine when given with tenofovir

Increase: tenofovir level—any product that decreases renal function

NURSING CONSIDERATIONS

Assess:

- Viral load, CD4+ T-cell count, plasma HIV RNA, serum creatinine/BUN/phosphate
- Resistance testing at start of therapy and at treatment failure
- Hepatic studies: AST, ALT, bilirubin; amylase, lipase, triglycerides periodically during treatment
- Bone, renal toxicity: if bone abnormalities are suspected, obtain tests; serum phosphorus, creatinine
- **Lactic acidosis, severe hepatomegaly with steatosis, Fanconi syndrome:** obtain baseline liver function tests; if elevated, discontinue treatment; discontinue even if liver function tests normal but lactic acidosis, hepatomegaly present, may be fatal

Perform/provide:

- Storage at 25° C (77° F)

Evaluate:

- Therapeutic response: decrease in signs, symptoms of HIV

Teach patient/family:

- To take without regard to food
- That GI complaints resolve after 3-4 wk of treatment
- Not to breastfeed while taking this product
- That product must be taken daily even if patient feels better
- That follow-up visits must be continued because serious toxicity may occur; that blood counts must be done q2wk
- That product will control symptoms but is not a cure for HIV; that patient is still infectious, may pass HIV virus on to others
- That other products may be necessary to prevent other infections
- That changes in body fat distribution may occur
- To notify prescriber of symptoms of lactic acidosis

terazosin (Rx)

(ter-ay'zoe-sin)

Func. class.: Antihypertensive

Chem. class.: α-Adrenergic blocker

ACTION: Decreases total vascular resistance, which is responsible for a decrease in B/P; this occurs by the blockade of α_1-adrenoreceptors

USES: Hypertension, as a single agent or in combination with diuretics or β-blockers; BPH

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (C), breastfeeding, children, prostate cancer, renal disease, syncope

DOSAGE AND ROUTES

Hypertension

- **Adult: PO** 1 mg at bedtime, may increase dose slowly to desired response; max 20 mg/day

Benign prostatic hyperplasia

- **Adult: PO** 1 mg at bedtime, gradually increase up to 5-10 mg; max 20 mg

Available forms: Caps 1, 2, 5, 10 mg

Administer:

- Give dose at bedtime; patient should not operate machinery because fainting may occur
- If treatment is interrupted for several days, restart with initial dose
- Without regard to food; feeding tube: place cap in 60 ml of warm tap water, stir until liquid spills from ruptured shell (5 min), stir until cap dissolves, draw solution into oral syringe, give through feeding tube, flush with water

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SIDE EFFECTS

CNS: *Dizziness, headache, drowsiness,* anxiety, depression, vertigo, weakness, fatigue
CV: Palpitations, orthostatic hypotension, tachycardia, edema, rebound hypertension
EENT: Blurred vision, epistaxis, tinnitus, dry mouth, red sclera, nasal congestion, sinusitis
GI: *Nausea,* vomiting, diarrhea, constipation, abdominal pain
GU: Urinary frequency, incontinence, impotence, priapism
RESP: Dyspnea, cough, pharyngitis

PHARMACOKINETICS

Half-life 9-12 hr; protein binding 90%-94%; metabolized in liver; excreted in urine, feces, peak 2-3 hr, onset 15 min, duration 24 hr

INTERACTIONS

Increase: hypotensive effects—β-blockers, nitroglycerin, verapamil, other antihypertensives, alcohol
Decrease: hypotensive effects—estrogens, NSAIDs, sympathomimetics, salicylates
Drug/Herb
Increase: antihypertensive effect—hawthorn
Decrease: antihypertensive effect—ephedra
Drug/Lab Test
Decrease: Hgb, WBC, platelets, albumin

NURSING CONSIDERATIONS

Assess:
• **BPH:** urinary patterns (hesitancy, frequency, change in stream, dribbling, dysuria, urgency)
• **Hypertension:** crackles, dyspnea, orthopnea q30min; orthostatic B/P, pulse, jugular venous distention q4hr; weight daily, I&O
• BUN, uric acid if patient receiving long-term therapy
Perform/provide:
• Cool storage in tight container
Evaluate:
• Therapeutic response: decreased B/P, edema in feet, legs; decreased symptoms of BPH
Teach patient/family:
• That fainting occasionally occurs after 1st dose; not to drive or operate machinery for 4 hr after 1st dose or after an increase in dose; to take 1st dose at bedtime
• To rise slowly from sitting or lying position
• Not to discontinue abruptly
• **Hypertension:** to continue with regimen including diet, exercise

terbinafine oral (Rx)

(ter-bin'a-feen)
Lamisil
Func. class.: Antifungal
Chem. class.: Synthetic allylamine derivative

Do not confuse:
terbinafine/terbutaline
LamISIL/LaMICtal

ACTION: Interferes with cell-membrane permeability of fungi such as *Trichophyton rubrum, Trichophyton mentagrophytes, Trichophyton tonsurans, Epidermophyton floccosum, Microsporum canis, Microsporum audouinii, Microsporum gypseum, Candida;* broad-spectrum antifungal

USES: (Oral) onychomycosis of toenail or fingernail due to dermatophytes, tinea capititis/corporis/cruris/pedis/versicolor
Unlabeled uses: Cutaneous candidiasis, tinea versicolor

CONTRAINDICATIONS: Hypersensitivity/olfactory, chronic/active hepatic disease, renal disease GFR ≤50 ml/min
Precautions: Pregnancy (B), breastfeeding, children, renal disease

DOSAGE AND ROUTES

• **Adult: PO** 250 mg/day × 6 wk (fingernail); × 12 wk (toenail)
Available forms: Tabs 250 mg; oral granules 125, 187.5 mg
Administer:
• **PO:** without regard to food
• **Granules:** take with food, sprinkle packet contents on pudding or nonacidic soft food, swallow without chewing, do not use fruit-based foods

SIDE EFFECTS

CNS: Depression
EENT: Tinnitus, hearing impairment
GI: Diarrhea, dyspepsia, vertigo, abdominal pain, nausea, hepatitis
HEMA: Neutropenia
INTEG: Rash, pruritus, urticaria, Stevens-Johnson syndrome, photosensitivity
MISC: Headache, hepatic enzyme changes, taste, visual/olfactory disturbance

PHARMACOKINETICS

Peak 1-2 hr, >99% protein binding, half-life 36 hr

INTERACTIONS

Increase: levels of dextromethorphan
Increase: terbinafine clearance—rifampin
Increase: clearance of cycloSPORINE
Decrease: terbinafine clearance—cimetidine
Decrease: metabolism of—CYP2D6 (antidysrthymics IC, III, amoxapine, atomoxetine, cloZAPine
Drug/Herb
• Side effects: cola nut, guarana, yerba maté, tea (black, green), coffee
Drug/Lab Test
Increase: LFTs

NURSING CONSIDERATIONS

Assess:
• Hepatic studies (ALT, AST) prior to beginning treatment; do not use in presence of hepatic disease
• CBC in treatment >6 wk
• Continuing infection: increased size, number of lesions
Perform/provide:
• Storage at <25° C (77° F), protect from light
Evaluate:
• Therapeutic response: decrease in size, number of lesions
Teach patient/family:
• That treatment may take 10 wk (toenail), 4 wk (fingernail)
• To notify prescriber of nausea, vomiting, fatigue, jaundice, dark urine, clay-colored stool, RUQ pain; may indicate hepatic dysfunction

terbinafine topical

See Appendix B

terbutaline (Rx)

(ter-byoo'ta-leen)
Bricanyl ♣
Func. class.: Selective β_2-agonist; bronchodilator
Chem. class.: Catecholamine

Do not confuse:
terbutaline/TOLBUTamide/terbinafine

ACTION: Relaxes bronchial smooth muscle by direct action on β_2-adrenergic receptors through the accumulation of cAMP at β-adrenergic receptor sites; bronchodilation, diuresis, CNS, cardiac stimulation occur; relaxes uterine smooth muscle

USES: Bronchospasm
Unlabeled uses: Premature labor, nonresponsive status asthmaticus in children (IV)

CONTRAINDICATIONS: Hypersensitivity to sympathomimetics, closed-angle glaucoma, tachydysrhythmias
Precautions: Pregnancy (B), breast-feeding, geriatric patients, cardiac disor-

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ders, hyperthyroidism, diabetes mellitus, prostatic hypertension, hypertension, seizure disorder

Black Box Warning: Labor

DOSAGE AND ROUTES

Bronchospasm

- **Adult and child >12 yr: PO** 2.5-5 mg q8hr; **SUBCUT** 0.25 mg q15-30min, max 0.5 mg in 4 hr
- **Adolescent ≤15 yr and child ≥12 yr: PO** 2.5 mg tid, max 7.5 mg/day
- **Child 6-11 yr (unlabeled): PO** 0.05 mg/kg q8hr, may increase slowly

Renal dose

- **Adult: PO** CCr 10-50 ml/min, 50% of dose; CCr <10 ml/min, avoid use

Tocolytic (preterm labor) (unlabeled)

- **Adult: SUBCUT** 0.25 mg q20min to 6 hr, hold if pulse >120 bpm

Available forms: Tabs 2.5, 5 mg; inj 1 mg/ml

Administer:

- With food; may be crushed
- 2 hr before bedtime to avoid sleeplessness

IV route (unlabeled)

- Only used if subcut is ineffective
- IV after diluting each 5 mg/1 L D_5W for inf
- IV, run 5 mcg/min; may increase 5 mcg q10min, titrate to response; after 1/2-1 hr, taper dose by 5 mcg; switch to PO as soon as possible

Y-site compatibilities: Insulin (regular)

SIDE EFFECTS

CNS: Tremors, anxiety, insomnia, headache, dizziness, stimulation

CV: Palpitations, tachycardia, hypertension, dysrhythmias, cardiac arrest, QT prolongation

GI: Nausea, vomiting

META: Hypokalemia, hyperglycemia

RESP: Paradoxical bronchospasm, dyspnea

PHARMACOKINETICS

PO: Onset 1/2 hr, peak 1-2 hr, duration 4-8 hr, half-life 3.4 hr

SUBCUT: Onset 6-15 min, peak 1/2-1 hr, duration 1 1/2-4 hr, half-life 5.7 hr

INTERACTIONS

- Hypertensive crisis: MAOIs

Increase: effects of both products—other sympathomimetics

Decrease: action—β-blockers; do not use together

Drug/Herb

Increase: effect—green tea (large amounts), guarana

NURSING CONSIDERATIONS

Assess:

- Respiratory function: vital capacity, forced expiratory volume, ABGs, B/P, pulse, respiratory pattern, lung sounds, sputum before and after treatment
- Tolerance in patients receiving long-term therapy; dose may have to be changed; monitor for rebound bronchospasm
- **Paradoxical bronchospasm:** dyspnea, wheezing; keep emergency equipment nearby
- **Labor:** maternal heart rate, B/P, contraction, fetal heart rate; can inhibit uterine contractions, labor; monitor for hypoglycemia

Perform/provide:

- Storage at room temp; do not use discolored sol
- Increase in fluids of >2 L/day

Evaluate:

- Therapeutic response: absence of dyspnea, wheezing

Teach patient/family:

- Not to use OTC medications because extra stimulation may occur
- About all aspects of product; to avoid smoking, smoke-filled rooms, persons with respiratory infections
- To increase fluids by >2 L/day; to allow 15 min between inhalation of product and inhaled product containing steroid

• To take on time; if missed, not to make up after 1 hr, to wait until next dose

terconazole vaginal antifungal

See Appendix B

teriparatide (Rx)

(tah-ree-par'ah-tide)

Forteo

Func. class.: Parathyroid hormone (rDNA)

Chem. class.: Teriparatide

ACTION: Contains human recombinant parathyroid hormone to stimulate new bone growth

USES: Postmenopausal women with osteoporosis, men with primary or hypogonadal osteoporosis who are at high risk for fracture, glucocorticoid-induced osteoporosis

Unlabeled uses: Hypoparathyroidism

CONTRAINDICATIONS: Hypersensitivity, increased baseline risk for osteosarcoma (Paget's disease, open epiphyses; previous bone radiation), bone metastases, history of skeletal malignancies, other metabolic bone diseases, preexisting hypercalcemia

Precautions: Pregnancy (C), breastfeeding, children, urolithiasis, hypotension, use >2 yr, cardiac disease

Black Box Warning: Secondary malignancy

DOSAGE AND ROUTES

• **Adult: SUBCUT** 20 mcg/day up to 2 yr (osteoporosis); long-term/lifetime use is recommended (glucocorticoid-induced osteoporosis)

Available forms: Prefilled pen delivery device (delivers 20 mcg/day)

Administer:

SUBCUT route

• Give by SUBCUT using disposable pen only; inject in thigh or abdomen; lightly pinch fold of skin; insert needle; release skin; inject at 90-degree angle over 5 sec; rotate inj sites

• Have patient sit or lie down; orthostatic hypotension may occur

• Protect from freezing, light; refrigerate pen

SIDE EFFECTS

CNS: Dizziness, headache, insomnia, depression, vertigo

CV: Hypertension, angina, syncope

GI: Nausea, diarrhea, dyspepsia, vomiting, constipation

INTEG: Rash, sweating

MISC: Pain, asthenia, hyperuricemia

MS: Arthralgia, leg cramps, back/leg pain, weakness, osteosarcoma (rare)

RESP: Rhinitis, cough, pharyngitis, pneumonia, dyspnea

PHARMACOKINETICS

SUBCUT: Extensively and rapidly absorbed, metabolized by liver, excreted by kidneys, terminal half-life 1 hr, onset rapid, peak ½ hr, duration 3 hr

INTERACTIONS

Increase: digoxin toxicity: digoxin

Drug/Lab Test

Increase: calcium, uric acid, urinary calcium

Decrease: phosphorous, magnesium

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Secondary malignancy: osteosarcoma, dependent on length of treatment; those at higher risk for osteosarcoma should not use this product

• Uric acid, magnesium, creatinine, BUN, urine pH, vit D, phosphate for normal serum levels; serum calcium may be transiently increased after dosing (max at 4-6 hr after dose)

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• Bone pain, headache, fatigue, changes in LOC, leg cramps
• **Signs of persistent hypercalcemia:** nausea, vomiting, constipation, lethargy, muscle weakness
• Nutritional status: diet for sources of vit D (milk, some seafood), calcium (dairy products, dark green vegetables), phosphates (dairy products)

Perform/provide:
• Store refrigerated, do not freeze; may be used for 28 days after first inj

Evaluate:
• Therapeutic response: increased bone mineral density

Teach patient/family:
• About the symptoms of hypercalcemia
• About foods rich in calcium, vit D
• How to use delivery device, dispose of needles; not to share pen with others, to use at same time of day
• To sit or lie down if dizziness or fast heartbeat occurs after 1st few doses
• To rotate administration sites
• To store pen in refrigerator, pen may be used for 28 days

tesamorelin

Egrifta

Func. class.: Pituitary hormone, growth hormone modifiers

ACTION: Binds to growth hormone releasing factor receptors on the pituitary somatotroph cells; binding stimulates the production, release of endogenous growth hormone (GH)

USES: Treatment of excess abdominal fat in HIV-infected patients with lipodystrophy

CONTRAINDICATIONS: Hypersensitivity to this product or mannitol, neoplastic disease, pregnancy X, *disruption of the hypothalamic-pituitary axis* (hypothalamic-pituitary-adrenal (HPA) suppression) due to hypophysectomy, hypopituitarism, pituitary tumor/surgery, radiation therapy of the head or head trauma, IV/IM administration

Precautions: Breastfeeding, CABG, diabetes, diabetic retinopathy, edema, geriatrics, children, infants, adolescents

DOSAGE AND ROUTES

• **Adult:** SUBCUT 2 mg/day

Available forms: Powder for injection 1 mg

Administer:

Subcut route:
• Visually inspect parenteral products for particulate matter and discoloration before use
• To reconstitute, inject 2.1 ml sterile water for inj into the 2-mg vial; use syringe with needle already attached; to avoid foaming, push plunger in slowly with needle on a slight angle so sterile water goes down the inside wall of vial; with needle and syringe attached to vial, keep vial upright and gently roll vial for 30 sec until mixed; do not shake; withdraw 2.1 ml of the reconstituted sol
• To administer, take syringe out of vial, place needle cap on its side against a clean flat surface, do not touch needle, hold syringe and slide needle into cap, push cap all the way or until it snaps shut; do not touch cap until it covers needle completely; remove needle, insert a 0.5 inch 27-G safety injection needle onto syringe; use immediately; throw away any unused product or used sterile water for inj, sol should be clear, do not use if discolored, cloudy, or has particles; slight foaming is acceptable; inject subcut into abdomen; avoid scar tissues, bruises, or navel; rotate inj sites in abdomen; slowly push plunger down until all sol has been injected
• After removing needle from skin, flip back needle shield until it snaps, covering the injection needle completely; keep pressing until you hear a click, which means the injection needle is protected
• Use a piece of sterile gauze to rub the inj site clean; if bleeding, apply pressure

to site with gauze for 30 sec; if bleeding continues, apply a bandage to site
• Properly dispose of used syringe, needles, vial, and sterile water for injection bottle in a sharps container

SIDE EFFECTS

CNS: Depression, peripheral neuropathy paresthesias, hypoesthesia, spasms, flushing, night sweats, insomnia, headache
CV: Chest pain, palpitations, hypertension, edema, peripheral edema
GI: Nausea, vomiting, upper abdominal pain, dyspepsia, diarrhea
INTEG: Pruritus, urticaria, rash, flushing, injection site reactions
MS: Arthralgia, joint swelling, stiffness, myalgias, carpal tunnel syndrome
RESP: Upper respiratory tract infection
SYST: Secondary malignancy

PHARMACOKINETICS

Half-life 26 min in healthy patients, 38 min and those with HIV infection; peak 0.15 hr

INTERACTIONS

Decrease: effect of—simvastatin, ritonavir, cortisone, prednisone

NURSING CONSIDERATIONS

Assess:
• **Lipodystrophy:** Assess for sunken cheeks, thinning arms and legs, fat accumulation in the abdomen, jaws and back of neck; after treatment these should lessen
• Monitor glycosylated hemoglobin A1c (HbA1c), serum IGF-1 concentrations, ophthalmologic exam
Evaluate:
• Decreasing lipodystrophy in HIV patients

testosterone cypionate (Rx)
Depo-Testosterone
testosterone enanthate (Rx)
Delatestryl
testosterone gel (Rx)
AndroGel, FORTESTA, Testim
testosterone pellets (Rx)
Testopel
testosterone transdermal (Rx)
Androderm
testosterone buccal (Rx)
Striant
testosterone topical solution
Axiron
Func. class.: Androgenic anabolic steroid
Chem. class.: Halogenated testosterone derivative

Controlled Substance Schedule III

ACTION: Increases weight by building body tissue; increases potassium, phosphorus, chloride, nitrogen levels, bone development

USES: Female breast cancer, hypogonadism, eunuchoidism, male climacteric, oligospermia, impotence, vulvar dystrophies, low testosterone levels, delayed male puberty (inj)
Unlabeled uses: Weight loss in AIDS patients, andropause, anemia, cryptorchidism, lichen sclerosis, microphallus, transsexualism

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CONTRAINDICATIONS: Pregnancy (X), breastfeeding, severe cardiac/renal/hepatic disease, hypersensitivity, genital bleeding (rare), male breast/prostate cancer

Precautions: Diabetes mellitus, CV disease, MI, urinary tract disorders, prostate cancer, hypercalcemia

Black Box Warning: Children, accidental exposure

DOSAGE AND ROUTES

Replacement

- **Adult: IM (enanthate or cypionate)** 50-400 mg q2-4wk; topical sol (Axiron) 60 mg (2 pump actuations), apply each AM
- **Adult (male) and child: SUBCUT (pellets)** 150-450 mg (2-6 pellets) inserted q3-6mo
- **Adult: TRANSDERMAL (Testoderm, Androderm)** 4-6 mg applied q24hr; **GEL (AndroGel)** 1% 5 mg applied q24hr, once daily; 1.62% 40.5 mg (2 pump actuations) q AM; topical sol **(Axiron)** 30 mg/actuation **BUCCAL** 1 buccal system (30 mg) to the gum region q12hr before meals/PM

Breast cancer

- **Adult: IM** 200-400 mg q2-4wk (cypionate or enanthate)

Delayed male puberty

- **Child >12 yr: IM** ≤100 mg/mo for ≤6 mo

Available forms: Enanthate: inj 200 mg/ml; **cypionate:** inj 100, 200 mg/ml; pellets 75 mg; **transdermal** 2, 4, mg/24 hr; **gel** 1%, 1.62%, 10 mg/actuation; **buccal system** 30 mg; **topical sol** 30 mg/actuation

Administer:

- Titrated dose; use lowest effective dose
- IM inj deep into upper outer quadrant of gluteal muscle
- **Transdermal patches:** Testoderm to skin of scrotum; Androderm to skin of back, upper arms, thighs, abdomen; area must be dry shaved; may be reapplied after bathing, swimming
- **Gel:** products not interchangeable, dosage and administration for AndroGel 1% differs from that of AndroGel 1.62%; apply daily to clean, dry area on shoulders, upper arms, or abdomen; women, children should not touch treated skin

Buccal system route

- Do not chew or swallow buccal system
- Rotate sites; place above incisor tooth on either side of mouth
- Open packet; place rounded side of surface against gum and hold firmly in place with finger over lip for 30 sec; if product falls off, replace with new system; discard in trash can away from children or pets

Topical solution route

- Using the provided applicator, apply the solution to clean, dry, intact skin of the axilla, preferably at the same time each morning; do not apply to any other part of the body; allow the solution to dry completely before dressing; if an antiperspirant or deodorant is used, apply at least 2 min before applying the solution; the pump must be primed before the first use by fully depressing the pump mechanism 3×, discard any solution that is released during the priming; to dispense the solution, position the nozzle over the applicator cup and carefully depress the pump once fully; the cup should be filled with no more than 1 pump actuation (30 mg); with the applicator upright, place it up into the axilla and wipe steadily down and up into the axilla; do not use fingers or hand to rub the solution; if multiple applications are necessary for the required dose, alternate application between the left and right axilla; when repeat application to the same axilla is necessary, allow the solution to dry completely before the next application; after use, rinse the applicator under running water and pat dry with tissue; wash hands with soap and water
- Following application, allow the site to dry before putting on clothing
- Direct contact of the medicated skin with the skin of another person can result in the transfer of residual testosterone and absorption by the other person;

to reduce accidental transfer, the patient should cover the application site(s) with clothing (eg, a T-shirt) after the solution has dried; the application site should be washed with soap and water prior to any skin-to-skin contact regardless of the length of time since application; in the case of direct contact, the other person should wash the area of contact with soap and water as soon as possible
• Patients should be advised that the topical solution is flammable; therefore, fire, flame, and smoking should be avoided during use
• Advise patients to avoid swimming or washing the application site until 2 hr following application of solution

SIDE EFFECTS

CNS: Dizziness, headache, fatigue, tremors, paresthesias, flushing, sweating, anxiety, lability, insomnia, carpal tunnel syndrome
CV: Increased B/P
EENT: Conjunctival edema, nasal congestion
ENDO: Abnormal glucose tolerance test
GI: Nausea, vomiting, constipation, weight gain, cholestatic jaundice
GU: Hematuria, amenorrhea, vaginitis, decreased libido, decreased breast size, clitoral hypertrophy, testicular atrophy, gynecomastia, large prostate
HEMA: Polycythemia
INTEG: Rash, acneiform lesions, oily hair/skin, flushing, sweating, acne vulgaris, alopecia, hirsutism
MS: Cramps, spasms

PHARMACOKINETICS

PO: Metabolized in liver; excreted in urine, breast milk; crosses placenta

INTERACTIONS

• Edema: ACTH, adrenal steroids, buPROPion
Increase: effects of oxyphenbutazone
Increase: PT—anticoagulants
Decrease: glucose levels may alter need for oral antidiabetics, insulin

Drug/Lab Test
Increase: serum cholesterol, blood glucose, urine glucose
Decrease: serum calcium, serum potassium, T_4, T_3, thyroid ^{131}I uptake test, urine 17-OHCS, 17-KS, PBI

NURSING CONSIDERATIONS

Assess:
• Weight daily; notify prescriber if weekly weight gain >5 lb
• B/P q4hr, Hgb/HCT
• I&O ratio; be alert for decreasing urinary output, increasing edema
• Growth rate, bone age in children; growth rate may be uneven (linear/bone growth) with extended use
• Electrolytes: K, Na, Cl, Ca; cholesterol
• Hepatic studies: ALT, AST, bilirubin
• Edema, hypertension, cardiac symptoms, jaundice
• Mental status: affect, mood, behavioral changes, aggression
• **Signs of masculinization in female:** increased libido, deepening of voice, decreased breast tissue, enlarged clitoris, menstrual irregularities; male: gynecomastia, impotence, testicular atrophy
• **Hypercalcemia:** lethargy, polyuria, polydipsia, nausea, vomiting, constipation; product may have to be decreased
• **Hypoglycemia** in diabetic patients; oral antidiabetic action is increased
Perform/provide:
• Diet with increased calories, protein; decrease sodium if edema occurs
Evaluate:
• Therapeutic response: 4-6 wk with osteoporosis
Teach patient/family:
• That product must be combined with complete health plan: diet, rest, exercise
• To notify prescriber if therapeutic response decreases, if edema occurs
• About changes in sex characteristics: priapism, gynecomastia, increased libido
• That women should report menstrual irregularities, voice changes, acne, facial

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hair growth; if pregnancy is planned or suspected
• That 1-3-mo course is necessary for response with breast cancer
• About the proper application of patches

tetracaine ophthalmic

See Appendix B

tetracaine topical

See Appendix B

tetracycline (Rx)

(tet-ra-sye'kleen)

Apo-Tetra ♣, Nu-Tetra ♣

Func. class.: Broad-spectrum antiinfective

Chem. class.: Tetracycline

ACTION: Inhibits protein synthesis and phosphorylation in microorganisms; bacteriostatic

USES: Syphilis, *Chlamydia trachomatis*, gonorrhea, lymphogranuloma venereum; uncommon gram-positive, gram-negative organisms; rickettsial infections

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, children <8 yr, hypersensitivity to tetracyclines
Precautions: Renal/hepatic disease, UV exposure

DOSAGE AND ROUTES

Susceptible gram-positive/gram-negative infections
• **Adult: PO** 250-500 mg q6hr
• **Child >8 yr: PO** 25-50 mg/kg/day in divided doses q6hr
Chlamydia trachomatis
• **Adult: PO** 500 mg qid × 7 days
Syphilis
• **Adult and adolescent: PO** 500 mg qid × 2 wk; if syphilis duration >1 yr, must treat 30 days
Brucellosis
• **Adult: PO** 500 mg q6hr × 3 wk with **IM** 1 g streptomycin bid × 1st wk then daily × 2nd wk
Urethral, endocervical, rectal infections *(C. trachomatis)*
• **Adult: PO** 500 mg qid × 7 days
Acne
• **Adult and adolescent: PO** 250 mg q6hr then 125-500 mg/day or every other day
Renal dose
• **Adult: PO** CCr 51-90 ml/min, give dose q8-12hr; CCr 10-50 ml/min, give dose q12-24hr; CCr <10 ml/min, give dose q24hr
Available forms: Caps 250, 500 mg
Administer:
• After C&S obtained
• 2 hr before or after iron products; 1 hr after antacid products
• Should be given on empty stomach (1 hr before or 2 hr after meals)

SIDE EFFECTS

CNS: Fever, headache, paresthesia
CV: Pericarditis
EENT: Dysphagia, glossitis, decreased calcification, discoloration of deciduous teeth, oral candidiasis, oral ulcers
GI: *Nausea,* abdominal pain, *vomiting, diarrhea,* anorexia, enterocolitis, hepatotoxicity, flatulence, abdominal cramps, epigastric burning, stomatitis, hepatitis, pseudomembranous colitis
GU: *Increased BUN,* azotemia, acute renal failure
HEMA: Eosinophilia, neutropenia, thrombocytopenia, leukocytosis, hemolytic anemia
INTEG: *Rash, urticaria, photosensitivity, increased pigmentation,* exfoliative dermatitis, pruritus, angioedema, Stevens-Johnson syndrome
MISC: Increased intracranial pressure, candidiasis

PHARMACOKINETICS

PO: Peak 2-3 hr; duration 6 hr; half-life 6-12 hr; excreted in urine, breast milk; crosses placenta; 65% protein bound

INTERACTIONS

⚠ Fatal nephrotoxicity: methoxyflurane
Increase: effect of warfarin, digoxin
Decrease: effect of tetracycline—antacids, sodium bicarbonate, alkali products, iron, cimetidine
Decrease: effect of penicillins
Drug/Herb
• Photosensitivity: dong quai
Drug/Food
Decrease: tetracycline effect—dairy products
Drug/Lab Test
Increase: BUN, LFTs

NURSING CONSIDERATIONS

Assess:
⚠ **Pseudomembranous colitis:** diarrhea, abdominal pain, fever, fatigue, anorexia; possible anemia, elevated WBC count, low serum albumin; stop product; usually either vancomycin or IV metroNIDAZOLE is given
• Signs of anemia: Hct, Hgb, fatigue
• I&O ratio
• Blood studies: PT, CBC, AST, ALT, BUN, creatinine if on prolonged therapy
• **Allergic reactions:** rash, itching, pruritus
• **Serious skin reactions:** angioedema, Stevens-Johnson syndrome, exfoliative dermatitis; report immediately after stopping product
• Nausea, vomiting, diarrhea; administer antiemetic, antacids as ordered
⚠ **Superinfection:** fever, malaise, redness, pain, swelling, drainage, perineal itching, diarrhea, changes in cough or sputum if on prolonged therapy
Perform/provide:
• Storage in tight, light-resistant container at room temp
Evaluate:
• Therapeutic response: absence of lesions, negative C&S, resolution of infection, prevention of malaria
Teach patient/family:
• To avoid sun exposure; that sunscreen does not seem to decrease photosensitivity
• That all prescribed medication must be taken to prevent superinfection
• To avoid milk products, antacids or to separate by 2 hr; to take with full glass of water, to take 1 hr before bedtime to prevent esophageal ulceration
• That tooth discoloration may occur
• To notify prescriber immediately of diarrhea with pus, mucous, fever, abdominal pain
⚠ To notify prescriber if pregnancy is planned or suspected, pregnancy (D)
• Not to use outdated products, Fanconi syndrome (nephrotoxicity) may occur

tetrahydrozoline nasal agent

See Appendix B

tetrahydrozoline ophthalmic

See Appendix B

theophylline (Rx)

(thee-off'i-lin)
Phyllocontin ♣, Theochron, Theo-24, Uniphyl
Func. class.: Bronchodilator, spasmolytic
Chem. class.: Methylxanthine

ACTION: Exact mechanism unknown, relaxes smooth muscle of respiratory system by blocking phosphodiesterase, which increases cAMP; increased cAMP alters intracellular calcium ion movements; produces bronchodilation, in-

creased pulmonary blood flow, relaxation of respiratory tract

USES: Bronchial asthma, bronchospasm associated with chronic bronchitis, emphysema, apnea during infancy for respiratory/myocardial stimulation
Unlabeled uses: Methotrexate toxicity, sleep apnea, status asthmaticus

CONTRAINDICATIONS: Hypersensitivity to xanthines, tachydysrhythmias
Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, CHF, cor pulmonale, hepatic disease, diabetes mellitus, hyperthyroidism, hypertension, seizure disorder, irritation of the rectum/lower colon, alcoholism, active peptic ulcer disease

DOSAGE AND ROUTES

Reversible airway obstruction (bronchospasm prophylaxis) associated with asthma or chronic obstructive pulmonary disease (COPD, emphysema, chronic bronchitis)
Calculate initial mg/kg dose based on ideal body weight as theophylline distributes poorly into body fat
Acute exacerbations of the symptoms and reversible airflow obstruction associated with asthma and other chronic lung diseases (COPD) along with inhaled β-2 selective agonists and systemic corticosteroids
• **Adult <60 yr/adolescent ≥16 yr: IV CONT INF** expressed in theophylline; initially, 0.4 mg/kg/hr; max 900 mg/day (otherwise healthy nonsmokers); patients who smoke may require an increased dose; give 0.2 mg/kg/hr (≥400 mg/day) in CHF, cor pulmonale, liver dysfunction, sepsis with multiorgan failure, shock; reduced doses may be needed in patients receiving other drugs that decrease theophylline clearance; adjust dosage based on serum concentrations
• **Adult ≥60 yr: IV CONT INF** initially, 0.3 mg/kg/hour; give 0.2 mg/kg/hr in CHF, cor pulmonale, liver dysfunction, sepsis with multiorgan failure, shock; reduced doses may be needed in patients receiving other drugs that decrease theophylline clearance; adjust dosage based serum concentrations; max 400 mg/day unless serum concentration and patient condition require a higher dose
• **Child ≥12 yr/adolescent ≥15 yr: IV CONT INF** Initially, 0.5 mg/kg/hr (healthy nonsmokers (up to 900 mg/day); 0.7 mg/kg/hr in smokers; 0.2 mg/kg/hr (up to 400 mg/day) in cardiac decompensation, cor pulmonale, liver dysfunction, sepsis with multiorgan failure, or shock); adjust dosage based on serum concentrations
• **Child 9-11 yr: IV CONT INF** Initially, 0.7 mg/kg/hr; reduced doses may be needed in patients receiving other drugs that decrease theophylline clearance; give 0.2 mg/kg/hr (up to 400 mg/day) in cardiac decompensation, cor pulmonale, liver dysfunction, sepsis with multiorgan failure, or shock; adjust dosage based on serum concentrations
• **Child 1-8 yr: IV CONT INF** Initially, 0.8 mg/kg/hr; reduced doses may be needed in patients receiving other drugs that decrease theophylline clearance; 0.2 mg/kg/hr (up to 400 mg/day) in cardiac decompensation, cor pulmonale, liver dysfunction, sepsis with multiorgan failure, or shock; adjust dosage based on serum concentrations
• **Infant 6-52 wk: IV CONT INF** Calculate initial dosage using the following equation: (0.008 × age in wk) + 0.21 = theophylline dosage in mg/kg/hr IV; reduced doses may be needed in patients with risk factors for reduced theophylline clearance (cimetidine therapy, cardiac or liver dysfunction, renal impairment in infant <3 mo); adjust dosage based on serum concentrations
For maintenance therapy of asthma or COPD
• **Adult/adolescent/child >45 kg: PO** (expressed in theophylline and reg re-

lease products) PO Initially, 300 mg/day in divided doses q6-8hr; after 3 days, if tolerated, increase dose to 400 mg/day in divided doses q6-8hr; after 3 more days, if tolerated, increase dose to 600 mg/day PO in divided doses q6-8hr; adjust dose to maintain therapeutic range; doses of 400-1600 mg/day may be needed, max 400 mg/day in patients with risk factors for decreased theophylline clearance (elderly patients >60 yr); NIH recommends initial dose for asthma of 10 mg/kg/day (max: 300 mg/day) titrated to serum concentration of 5-15 mcg/ml (usual max: 800 mg/day in ≥12 yr and 16 mg/kg/day in children 1-11 yr)

• **Child/adolescent ≤15 yr old and ≤45 kg: PO** Initially, 12-14 mg/kg (max 300 mg) per day in divided doses q4-6hr; after 3 days, if tolerated, may increase to 16 mg/kg (max 400 mg) per day in divided doses q4-6hr; after 3 more days, if tolerated and if needed, increase dose to 20 mg/kg (max 600 mg) per day in divided doses q4-6hr; adjust dose to maintain therapeutic range (doses of 10-36 mg/kg/day in child 1-9 yr may be needed); max 16 mg/kg (400 mg) per day in patients with risk factors for decreased theophylline clearance or who cannot receive recommended serum concentration monitoring; NIH recommends initial dose for asthma of 10 mg/kg/day (max 300 mg/day) titrated to serum concentration of 5-15 mcg/ml (usual max 800 mg/day in patients ≥12 yr and 16 mg/kg/day in children 1-11 yr)

• **Neonate/infant ≤52 wk: PO** Calculate initial dose using the following equation: [(0.2 × age in wks) + 5] × (kg body weight) = theophylline dosage in mg/day; in infants ≤26 wk, divide dose and administer q8hr and in infant >26 wk, divide dose and give q6hr; adjust dose to maintain a steady-state serum concentration of 5-10 mcg/ml in neonates and 10-15 mcg/ml in infants; NIH recommends initial dose for asthma of 10 mg/kg/day titrated to theophylline serum concentration of 5-15 mcg/ml, max in mg/kg/day = [(0.2 × age in weeks) + 5]

• Extended-release products are to be used only for chronic disease management; do not use in treatment of acute symptoms of asthma and reversible bronchospasm

• **Adult/adolescents/child ≥12 yr and >45 kg: (Theo-24 Cap) PO** Initially, 300-400 mg/day q24hr; evening dosing is not recommended; after 3 days, if tolerated, increase to 400-600 mg/day q24hr; adjust dose to maintain therapeutic range; doses of 400-1600 mg/day may be needed; max 400 mg/day in patients with decreased theophylline clearance, (elderly >60 yr), and in those who cannot receive recommended serum concentration monitoring

• **Child >12 yr/adolescent <16 yr and <45 kg: (Theo-24 Cap) PO** Initially, 12-14 mg/kg (max 300 mg) per day q24hr; evening dosing is not recommended; after 3 days, if tolerated, may increase to 16 mg/kg (max 400 mg) per day; after 3 more days, if tolerated and if needed, increase to 20 mg/kg (max 600 mg) per day; adjust dose to maintain therapeutic range; max 16 mg/kg/day up to 400 mg/day in patients with decreased theophylline clearance

Treatment of methotrexate toxicity (unlabeled)

• **Adult/adolescents/child ≥3 yr: IV** 2.5 mg/kg over 45-60 min

Available forms: Inj 250 mg/10 ml, 500 mg/20 ml, 100 mg/100 ml in 0.45% NaCl, 200 mg/100 ml in 0.45% NaCl; rect supp 250, 500 mg; tabs 100, 200 mg; ext rel tab 100, 200, 300, 400, 450, 600 mg; ext rel cap 100, 200, 300, 400; elixir 80 mg/15 ml

Administer:

• Avoid IM inj; pain and tissue damage may occur

PO route

• Avoid giving with food

Continuous IV INF route

• Only clear sol; flush IV line before dose

• May be **diluted** for IV inf in 100-200 ml in D_5W, $D_{10}W$, $D_{20}W$, 0.9% NaCl, 0.45% NaCl, LR

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• **Give** loading dose over ½ hr; max rate of inf 25 mg/min, use inf pump; after loading dose, give by cont inf

Syringe compatibilities: Heparin, metoclopramide, PENTobarbital, thiopental

Y-site compatibilities: Allopurinol, amifostine, amphotericin B, amrinone, aztreonam, cefTAZidime, cholesteryl sulfate complex, cimetidine, cladribine, DOXOrubicin liposome, enalaprilat, esmolol, famotidine, filgrastim, fluconazole, fludarabine, foscarnet, gallium, granisetron, heparin sodium with hydrocortisone sodium succinate, labetalol, melphalan, meropenem, netilmicin, PACLitaxel, pancuronium, piperacillin/tazobactam, potassium chloride, propofol, ranitidine, remifentanil, sargramostim, tacrolimus, teniposide, thiotepa, tolazoline, vecuronium

SIDE EFFECTS

CNS: Anxiety, restlessness, insomnia, *dizziness,* seizures, headache, lightheadedness, muscle twitching, tremors

CV: *Palpitations, sinus tachycardia,* hypotension, flushing, dysrhythmias, edema

GI: *Nausea, vomiting,* diarrhea, dyspepsia, anal irritation (suppositories), epigastric pain, reflux, anorexia

GU: Urinary frequency, SIADH

INTEG: Flushing, urticaria

MISC: Hyperglycemia

RESP: Tachypnea, increased respiratory rate

PHARMACOKINETICS

Metabolized by liver (caffeine); excreted in urine; crosses placenta; appears in breast milk; half-life 6.5-10.5 hr; half-life increased in geriatric patients, hepatic disease, CHF, neonates, premature infants; protein binding 40%, crosses into CSF

PO: Onset ¼ hr, peak 1-2 hr, duration 6-8 hr, well absorbed

PO-ER: Onset unknown, peak 4-7 hr, duration 8-12 hr, well absorbed slowly

IV: Onset rapid, duration 6-8 hr

RECT: Onset erratic, peak 1-2 hr, duration 6-8 hr, supp absorbed erratically, sol absorbed quickly

INTERACTIONS

• Dose-dependent reversal of neuromuscular blockade

• Dysrhythmias: halothane

• May increase or decrease theophylline levels: carBAMazepine, loop diuretics, isoniazid

Increase: action of theophylline, toxicity—cimetidine, nonselective β-blockers, erythromycin, clarithromycin, oral contraceptives, corticosteroids, interferons, fluoroquinolones, disulfiram, mexiletine, fluvoxaMINE, high doses of allopurinol, influenza vaccines, interferon, benzodiazepines

Increase: adverse reactions—tetracyclines

Increase: elimination—smoking

Decrease: effects of lithium

Decrease: effect of theophylline—nicotine products, adrenergics, barbiturates, phenytoin, ketoconazole, rifampin

Drug/Herb

Increase: effects—cola tree, guarana, yerba maté, tea (black, green), horsetail, ginseng, Siberian ginseng

Decrease: effects—St. John's wort

Drug/Food

Increase: effect—xanthines

Increase: elimination by low-carbohydrate, high-protein diet; charcoal-broiled beef

Decrease: elimination by high-carbohydrate, low-protein diet

Drug/Lab Test

Increase: plasma-free fatty acids

NURSING CONSIDERATIONS

Assess:

• Theophylline blood levels (therapeutic level is 10-20 mcg/ml); toxicity may occur with small increase above 20 mcg/ml, especially in geriatric patients; whether theophylline was given recently (24 hr)

- Monitor I&O; diuresis occurs; dehydration may occur in geriatric patients or children
- Liver function tests: periodically, lower doses may be required in those with moderate to severe hepatic disease
- Respiratory rate, rhythm, depth; auscultate lung fields bilaterally; notify prescriber of abnormalities, monitor pulmonary function tests
- Allergic reactions: rash, urticaria; if these occur, product should be discontinued

Perform/provide:
- Storage of diluted sol for 24 hr if refrigerated

Evaluate:
- Therapeutic response: decreased dyspnea, respiratory stimulation for infants, clear lung fields bilaterally

Teach patient/family:
- To take doses as prescribed, not to skip dose, not to double dose
- To check OTC medications, current prescription medications for ePHEDrine; will increase CNS stimulation; not to drink alcohol or caffeine products (tea, coffee, chocolate, colas); to avoid large amounts of charcoal-grilled beef
- To avoid hazardous activities; dizziness may occur
- If GI upset occurs, to take product with 8 oz water; to avoid food because absorption may be decreased
- **To notify prescriber immediately about toxicity:** insomnia, anxiety, nausea, vomiting, rapid pulse, seizures, flushing, headache, diarrhea
- To notify prescriber about changes in smoking habits because a change in dose may be required; to avoid smoking because it decreases drug blood levels and terminal half-life
- To increase fluids to 2 L/day to decrease secretion viscosity

thiamine (vit B_1) (PO-OTC; IV, IM-Rx)

Vitamin B-1

Func. class.: Vit B_1

Chem. class.: Water soluble

Do not confuse:
thiamine/Tenormin

ACTION: Needed for pyruvate metabolism, carbohydrate metabolism

USES: Vit B_1 deficiency or polyneuritis, cheilosis adjunct with thiamine beriberi, Wernicke-Korsakoff syndrome, pellagra, metabolic disorders, alcoholism

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (A)

DOSAGE AND ROUTES

RDA
- **Adult: PO** (Males) 1.2-1.5 mg; (females) 1.1 mg; (pregnancy) 1.4 mg; (breastfeeding) 1.4 mg
- **Child 9-13 yr: PO** 0.9 mg
- **Child 4-8 yr: PO** 0.6 mg
- **Child 1-3 yr: PO** 0.5 mg
- **Infant 7 mo-1 yr: PO** 0.3 mg
- **Neonate and infant ≤6 mo: PO** 0.2 mg

Beriberi
- **Adult: PO** 5-30 mg daily or in 3 divided doses × 1 mo; **IM/IV** 5-30 mg daily or in 3 divided doses then convert to **PO**
- **Infant/child: PO** 10-50 mg daily × 2 wk then 5-10 mg daily × 1 mo; **IV/IM** 10-25 mg/day × 2 wk then 5-10 mg daily × 1 mo

Available forms: Tabs 50, 100, 250, 500 mg; inj 100 mg/ml; enteric-coated tabs 20 mg

Administer:

IM route
- By IM inj; rotate sites if pain and inflammation occur; do not mix with alkaline sol; Z-track to minimize pain

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Direct IV route
- Undiluted at 100 mg/ml over 5 min

Continuous IV INF route
- Diluted in compatible IV sol

Y-site compatibilities: Famotidine

SIDE EFFECTS

CNS: Weakness, restlessness
CV: Collapse, pulmonary edema, hypotension
EENT: Tightness of throat
GI: Hemorrhage, *nausea, diarrhea*
INTEG: Angioneurotic edema, cyanosis, sweating, warmth
SYST: Anaphylaxis

PHARMACOKINETICS

PO/INJ: Unused amounts excreted in urine (unchanged)

NURSING CONSIDERATIONS

Assess:
- **Anaphylaxis (IV only):** swelling of face, eyes, lips, throat, wheezing
- **Thiamine deficiency:** anorexia, weakness/pain, depression, confusion, blurred vision, tachycardia
- Nutritional status: yeast, beef, liver, whole or enriched grains, legumes

Perform/provide:
- Storage in tight, light-resistant container
- Application of cold to help decrease pain

Evaluate:
- Therapeutic response: absence of nausea, vomiting, anorexia, insomnia, tachycardia, paresthesias, depression, muscle weakness

Teach patient/family:
- About the necessary foods to be included in diet: yeast, beef, liver, legumes, whole grains

thioridazine (Rx)

(thye-or-rid'a-zeen)
Func. class.: Antipsychotic (typical)
Chem. class.: Phenothiazine piperidine

Do not confuse:
thioridazine/thiothixene/Thorazine

ACTION: Depresses cerebral cortex, hypothalamus, limbic system, which control activity, aggression; blocks neurotransmission produced by dopamine at synapse; exhibits strong α-adrenergic and anticholinergic blocking action; mechanism for antipsychotic effects is unclear

USES: Psychotic disorders, schizophrenia, behavioral problems in children, anxiety, major depressive disorders, organic brain syndrome
Unlabeled uses: Behavioral symptoms associated with dementia in geriatric patients

CONTRAINDICATIONS: Children <2 yr, hypersensitivity, coma, CNS depression

Black Box Warning: QT prolongation, cardiac dysrhythmias

Precautions: Pregnancy (C), breastfeeding, seizure disorders, hypertension, hepatic/pulmonary disease, renal failure, BPH, glaucoma, phenothiazine hypersensitivity, suicidal ideation, smoking, Reye's syndrome, Parkinson's disease

Black Box Warning: Cardiac disease, dementia, AV block, bundle branch block, torsades de pointes

DOSAGE AND ROUTES

Psychosis
- **Adult: PO** 25-100 mg tid, max 800 mg/day; dose gradually increased to desired response then reduced to minimum maintenance

Depression/behavioral problems/ organic brain syndrome

- **Adult: PO** 25 mg tid, range from 10 mg bid-qid to 50 mg tid-qid, max 800 mg/day for short period
- **Geriatric: PO** 10-25 mg daily-bid, increase 4-7 days by 10-25 mg to desired dose, max 300 mg/day for short period
- **Child 2-12 yr: PO** 0.5-3 mg/kg/day in divided doses, max 3 mg/kg/day

Available forms: Tabs 10, 25, 50, 100 mg

Administer:

- Antiparkinsonian agent on order from prescriber for EPS
- Avoid use with CNS depressants
- Antacids separated by 2 hr or more

SIDE EFFECTS

CNS: *EPS: pseudoparkinsonism, akathisia, dystonia, tardive dyskinesia,* seizures, *headache,* confusion, neuroleptic malignant syndrome, dizziness, drowsiness

CV: Orthostatic hypotension, cardiac arrest, ECG changes, tachycardia, QT prolongation, torsades de pointes

EENT: Blurred vision, glaucoma, dry eyes

GI: *Dry mouth, nausea, vomiting, anorexia, constipation,* diarrhea, jaundice, weight gain

GU: Urinary retention, urinary frequency, enuresis, impotence, amenorrhea, gynecomastia, ejaculation dysfunction, priapism

HEMA: Anemia, leukopenia, leukocytosis, agranulocytosis

INTEG: *Rash,* photosensitivity, dermatitis

RESP: Laryngospasm, dyspnea, respiratory depression

PHARMACOKINETICS

PO: Onset erratic; peak 2-4 hr; metabolized by liver; excreted in urine, breast milk; crosses placenta; half-life 26-36 hr; 91%-99% protein binding

INTERACTIONS

Increase: QT prolongation—class IA/III antidysrhythmics, some phenothiazines, β agonists, local anesthetics, tricyclics, haloperidol, chloroquine, droperidol, pentamidine; CYP3A4 inhibitors (amiodarone, clarithromycin, erythromycin, telithromycin, troleandomycin), arsenic trioxide, levomethadyl; CYP3A4 substrates (methadone, pimozide, QUEtiapine, quiNIDine, risperiDONE, ziprasidone), CYP2D6 inhibitors

- Oversedation: other CNS depressants, alcohol, barbiturate anesthetics

Increase: anticholinergic effects—anticholinergics

Decrease: antiparkinson's agent effects

Decrease: thioridazine effect—lithium, barbiturates

Decrease: antihypertensive effect—centrally acting antihypertensives

Decrease: absorption—aluminum hydroxide, magnesium hydroxide antacids

Drug/Lab Test

Increase: LFTs, prolactin, bilirubin, alk phos

Decrease: Hct/Hgb, platelets, granulocytes, leukocytes, neutrocytes, eosinophils

NURSING CONSIDERATIONS

Assess:

- Mental status before 1st dose
- I&O ratio; palpate bladder if low urinary output occurs, urinary retention may be the cause
- Bilirubin, CBC, LFTs monthly
- Urinalysis recommended before and during prolonged therapy
- Affect, orientation, LOC, reflexes, gait, coordination, sleep pattern disturbances
- B/P standing, lying; include pulse and respirations q4hr during initial treatment; establish baseline before starting treatment; report drops of 30 mm Hg
- Dizziness, faintness, palpitations, tachycardia on rising
- **EPS** including akathisia (inability to sit still, no pattern to movements), tardive dyskinesia (bizarre movements of jaw, mouth, tongue, extremities), pseudoparkinsonism (rigidity, tremors, pill rolling, shuffling gait)

T

Neuroleptic malignancy syndrome: altered mental status, muscle rigidity, increased CPK, hyperthermia, dyspnea, fatigue

QT prolongation: ECG, ejection fraction; assess for chest pain, palpitations, dyspnea

• Constipation, urinary retention daily; increase bulk, water in diet

Perform/provide:

• Supervised ambulation if needed until stabilized on medication; do not involve patient in strenuous exercise program because fainting is possible; patient should not stand still for long periods

• Sips of water, candy, gum for dry mouth

• Storage in tight, light-resistant container; avoid contact with skin

Evaluate:

• Therapeutic response: decrease in emotional excitement, hallucinations, delusions, paranoia; reorganization of patterns of thought, speech

Teach patient/family:

• That orthostatic hypotension occurs frequently; to rise from sitting or lying position gradually; to avoid hazardous activities until stabilized on medication

• To avoid hot tubs, hot showers, tub baths because hypotension may occur

• To avoid abrupt withdrawal of thioridazine because EPS may result; that product should be withdrawn slowly

• To avoid OTC preparations (cough, hay fever, cold) unless approved by prescriber; that serious product interactions may occur; to avoid use with alcohol because increased drowsiness may occur

• To use sunscreen to prevent burns

• About compliance with product regimen

• About the necessity for meticulous oral hygiene because oral candidiasis may occur

• To report sore throat, malaise, fever, bleeding, mouth sores; if these occur, CBC should be drawn and product discontinued; that product may cause vision impairment, should be reported to prescriber

• That in hot weather, heat stroke may occur; to take extra precautions to stay cool

• That product may cause discoloration of urine

TREATMENT OF OVERDOSE:

Lavage if orally ingested, provide an airway; do not induce vomiting; CV monitoring, continuous ECG

thyroid USP (desiccated) (Rx)

(thye'roid)

Armour Thyroid, Bio-Throid, Nature Thyroid, NP Thyroid

Func. class.: Thyroid hormone

Chem. class.: Active thyroid hormone in natural state and ratio

ACTION: Increases metabolic rates, increases cardiac output, O_2 consumption, body temp, blood volume; growth, development at cellular level

USES: Hypothyroidism, cretinism (juvenile hypothyroidism), myxedema

CONTRAINDICATIONS: Adrenal insufficiency, MI, thyrotoxicosis, porcine protein hypersensitivity

Black Box Warning: Obesity treatment

Precautions: Pregnancy (A), breastfeeding, geriatric patients, angina pectoris, hypertension, ischemia, cardiac disease

DOSAGE AND ROUTES

Hypothyroidism

• **Adult: PO** 60 mg/day, increased by 30 mg/mo until desired response; maintenance dose 60-120 mg/day

• **Geriatric: PO** 7.5-15 mg/day, increase dose q6-8wk until desired response

Cretinism/juvenile hypothyroidism

• **Child: PO** 15 mg/day, then 30 mg/day after 2 wk, then 60 mg/day after another 2 wk; maintenance dose 60-180 mg/day

Myxedema

• **Adult: PO** 15 mg/day, double dose q2wk, maintenance 60-180 mg/day

Available forms: Tabs 16, 32, 60, 65, 98, 130, 195, 260, 325 mg; enteric-coated tabs 32, 65, 130 mg; sugarcoated tabs 32, 65, 130, 195 mg; caps 65, 130, 195, 325 mg

Administer:

• In AM if possible as single dose to decrease sleeplessness; separate iron, calcium products by 4 hr

• At same time each day to maintain product level

• Only for hormone imbalances; not to be used for obesity, male infertility, menstrual disorders, lethargy

• Lowest dose that relieves symptoms

SIDE EFFECTS

CNS: *Insomnia, tremors,* headache, thyroid storm

CV: *Tachycardia, palpitations, angina, dysrhythmias,* hypertension, cardiac arrest

GI: Nausea, diarrhea, increased or decreased appetite, cramps

MISC: Menstrual irregularities, weight loss, sweating, heat intolerance, fever

PHARMACOKINETICS

PO: Peak 12-48 hr, half-life 6-7 days

INTERACTIONS

Increase: effects of anticoagulants, sympathomimetics, tricyclics, catecholamines

Decrease: thyroid absorption—bile acid sequestrants, aluminum, magnesium, calcium

Decrease: thyroid effects—estrogens

Drug/Herb

Decrease: thyroid effect—soy

Drug/Lab Test

Increase: CPK, LDH, AST, PBI, blood glucose

Decrease: thyroid function tests

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Obesity treatment: use can lead to serious or life-threatening toxicity

• B/P, pulse before each dose

• I&O ratio

• Weight daily in same clothing, using same scale, at same time of day

• Height, growth rate of child

• T_3, T_4, which are decreased; radioimmunoassay of TSH, which is increased; radio uptake, which is decreased if dosage is too low

• PT may require decreased anticoagulant; check for bleeding, bruising

• **Hyperthyroidism:** increased nervousness, excitability, irritability; may indicate too high of a dose of medication, usually after 1-3 wk of treatment

• **Hypothyroidism:** lethargy, cold intolerance, weight gain, constipation, muscle cramps; may indicate too low of a dose

• Cardiac status: angina, palpitation, chest pain, change in VS

Perform/provide:

• Removal of medication 4 wk before RAIU test

Evaluate:

• Therapeutic response: absence of depression; increased weight loss, diuresis, pulse, appetite; absence of constipation, peripheral edema, cold intolerance; pale, cool, dry skin; brittle nails, alopecia, coarse hair, menorrhagia, night blindness, paresthesias, syncope, stupor, coma, rosy cheeks

Teach patient/family:

• That hair loss will occur in child, is temporary

• To report excitability, irritability, anxiety; indicates overdose

• Not to switch brands unless directed by prescriber

• That strong odor is normal

• That hypothyroid child will show almost immediate behavior/personality change

• That treatment product is not to be taken to reduce weight

T

- To avoid OTC preparations with iodine; to read labels
- To separate iron, calcium products by 4 hr
- To avoid iodine food, iodized salt, soybeans, tofu, turnips, some seafood, some bread

tiaGABine (Rx)

(tie-ah-ga'been)

Gabitril

Func. class.: Anticonvulsant

Do not confuse:
tiaGABine/tiZANidine

ACTION: Inhibits reuptake and metabolism of GABA, may increase seizure threshold; structurally similar to GABA; tiaGABine binding sites in neocortex, hippocampus

USES: Adjunct treatment of partial seizures in adults and children ≥12 yr

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (C), breastfeeding, children <12 yr, geriatric patients, renal/hepatic disease, suicidal thoughts/behaviors, status epilepticus, mania, bipolar disorder, abrupt discontinuation, depression

DOSAGE AND ROUTES

When not given with a CYP3A4 enzyme, effect of tiaGABine is doubled; lower doses are indicated

- **Adult (those receiving an enzyme-inducing antiepileptic product): PO** 4 mg/day in divided doses, may increase by 4-8 mg/wk until desired response, max 56 mg/day
- **Child 12-18 yr: PO** 4 mg/day, may increase by 4 mg at beginning of wk 2; may increase by 4-8 mg/wk until desired response; max 32 mg/day

Hepatic dose

- **Adult: PO** reduce dose or increase dosing interval

Available forms: Tabs 2, 4, 12, 16 mg

Administer:

- With food

SIDE EFFECTS

CNS: *Dizziness, anxiety,* somnolence, ataxia, confusion, *asthenia,* unsteady gait, depression, suicidal ideation, seizures

CV: Vasodilation

GI: Nausea, vomiting, diarrhea, increased appetite

INTEG: Pruritus, rash, Stevens-Johnson syndrome

RESP: Pharyngitis, coughing

PHARMACOKINETICS

Absorption >95%; peak 45 min; protein binding 96%; metabolized in the liver via CYP3A4; half-life 7-9 hr without enzyme inducers, 2-5 hr with enzyme inducers

INTERACTIONS

- Lower doses may be needed when used with valproate

Increase: CNS depression—CNS depressants, alcohol

Decrease: tiaGABine effect—sevelamer

Decrease: effect—carBAMazepine, PHENObarbital, phenytoin, primidone

Drug/Food

Decrease: rate of absorption—high-fat meal

NURSING CONSIDERATIONS

Assess:

- Renal studies: urinalysis, BUN, urine creatinine q3mo
- Hepatic studies: ALT, AST, bilirubin
- **Seizures:** location, duration, presence of aura; assess for weakness
- Withdraw gradually to prevent seizures
- May cause status epilepticus and unexplained death

⚠ Mental status: mood, sensorium, affect, behavioral changes, suicidal thoughts/behaviors; if mental status

changes, notify prescriber, hypomania may be present before suicide attempt

Perform/provide:

- Storage at room temp, away from heat and light
- Assistance with ambulation during early part of treatment; dizziness occurs
- Seizure precautions: padded side rails; move objects that may harm patient

Evaluate:

- Therapeutic response: decreased seizure activity; document on patient's chart

Teach patient/family:

- To carry emergency ID stating patient's name, products taken, condition, prescriber's name and phone number
- To avoid driving, other activities that require alertness
- Not to discontinue medication quickly after long-term use
- To take with food
- To notify prescriber if pregnancy is planned or suspected, avoid breastfeeding

TREATMENT OF OVERDOSE:

Lavage, VS

ticagrelor

Brilinta

Func. class.: Platelet inhibitor

Chem. class.: ADP receptor antagonist

ACTION:

Reversibly bind to the platelet receptor, preventing platelet activation

USES:

Arterial thromboembolism prophylaxis in acute coronary syndrome (ACS) (unstable angina, acute MI), including in patients undergoing percutaneous coronary intervention (PCI)

CONTRAINDICATIONS:

Hypersensitivity, severe hepatic disease

Black Box Warning: Bleeding, intracranial bleeding

Precautions: Pregnancy (category C), breastfeeding, infants, neonates, children, GI bleeding, hepatic disease, abrupt discontinuation

Black Box Warning: Coronary artery bypass graft surgery (CABG), surgery

DOSAGE AND ROUTES

- **Adult: PO** loading dose 180 mg with aspirin (usually 325 mg PO); then, give 90 mg bid with aspirin 75-100 mg/day, do not give maintenance doses of aspirin >100 mg/day

Available forms: Tab 90 mg

Administer:

- May be taken without regard to food
- Discontinue 5-7 days before surgery
- May be crushed (90 mg tab) and mixed with purified water, 100 mg (PO) or 50 ml (NG)

SIDE EFFECTS

CNS: Headache, dizziness, fatigue

CV: Hypertension, hypotension, chest pain, atrial fibrillation, bradyarrhythmias, syncope, ventricular pauses

GI: Nausea, diarrhea

HEMA: Serious, fatal bleeding

MISC: Back pain, hyperuricemia, gynecomastia

RESP: Dyspnea, cough

PHARMACOKINETICS

Absolute bioavailability 36%, protein binding (>99%), metabolism by CYP3A4, weak P-glycoprotein substrates and inhibitors, elimination for product and metabolite are hepatic and biliary, 84% excreted in feces, 26% in urine, half-life is 7 hr for ticagrelor, 9 hr for metabolite, maximum inhibition of platelet aggregation (IPA) effect 2 hr, maintained ≥8 hr, peak 1.5 hr product, 2.5 hr metabolite

INTERACTIONS

Increase: bleeding risk—CYP3A4 inhibitors (ketoconazole, itraconazole, voriconazole, clarithromycin, telithromycin, nefazodone, ritonavir, lopinavir, ritonavir,

saquinavir, nelfinavir, indinavir, atazanavir, delavirdine, isoniazid, dalfopristin, quinupristin, tipranavir
Decrease: ticagrelor action—CYP3A4 inducers (rifampin, dexamethasone, phenytoin, carBAMazepine, PHENobarbital)
Increase: effect of—simvastatin lovastatin
Increase: bleeding risk—NSAIDs, anticoagulants, platelet inhibitors
Increase or decrease: digoxin
Drug/Lab Test
Increase: serum creatinine

NURSING CONSIDERATIONS

Assess:
• **Thromboembolism:** Monitor CBC with differential with platelet count baseline and periodically during treatment

Black Box Warning: Bleeding: Assess for bleeding that may occur when aspirin is combined with this product, some bleeding can be fatal

• **Abrupt discontinuation:** Do not discontinue abruptly, may increase risk for MI, stent thrombosis, death
Perform/provide:
• Storage at room temperature, in original container in dry place
Evaluate:
• Prevention of thromboembolism
Teach patient/family:
• To take only as prescribed, not to skip or double doses; if a dose is missed, to take next dose at scheduled time

Black Box Warning: To notify prescriber of chills, fever, bruising, bleeding

• Not to use any prescription, OTC products, herbs without approval of prescriber; products with aspirin, NSAIDs may cause bleeding
• To notify all health care providers of product use
• That product can be taken without regard to meals
• That it may take longer for bleeding to stop

ticarcillin/clavulanate (Rx)

Timentin
Func. class.: Broad-spectrum antiinfective
Chem. class.: Extended-spectrum penicillin, β-lactamase inhibitor

ACTION: Interferes with cell-wall replication of susceptible organisms; osmotically unstable cell wall swells, bursts from osmotic pressure; clavulanate inhibits β-lactamase and protects against enzymatic degradation of ticarcillin

USES: Respiratory, soft-tissue, and urinary tract infections; bacterial septicemia; effective for gram-positive cocci *(Staphylococcus aureus, Streptococcus faecalis, Streptococcus pneumoniae)*, gram-negative cocci *(Neisseria gonorrhoeae)*, gram-positive bacilli *(Clostridium perfringens, Clostridium tetani)*, gram-negative bacilli *(Bacteroides, Fusobacterium nucleatum, Escherichia coli, Proteus mirabilis, Salmonella, Morganella morganii, Proteus rettgeri, Enterobacter, Pseudomonas aeruginosa, Serratia)*; and *Peptococcus, Peptostreptococcus,* and *Eubacterium*

CONTRAINDICATIONS: Neonates, hypersensitivity to penicillins
Precautions: Pregnancy (B), hypersensitivity to cephalosporins, renal disease

DOSAGE AND ROUTES

Systemic/urinary tract infections, moderate/severe infections
• **Adult ≥60 kg: IV INF** 3.1 g q4-6hr
• **Adult <60 kg: IV INF** 200-300 mg/kg/day q4-6hr
• **Child >60 kg: IV INF** 3.1 g q4-6hr
• **Child <60 kg: IV INF** 300 mg/kg/day q4hr

• **Full-term neonates/infants <3 mo (unlabeled): IV** 50 mg/kg q4hr for severe infections; **IV** 50 mg/kg q6hr for mild to moderate infections

Mild to moderate infections

• **Child ≥60 kg: IV INF** 3.1 g q6hr

• **Child <60 kg: IV INF** 200 mg/kg/day q6hr

Renal dose

• **Adult: IV INF** loading dose 3.1 g; CCr 60 ml/min, 3.1 g q4hr; CCr 30-60 ml/min, 2 g q4hr; CCr 10-30 ml/min, 2 g q8hr; CCr <10 ml/min, 2 g q12hr; CCr <10 ml/min with hepatic dysfunction, 2 g q24hr

Available forms: Inj 3 g ticarcillin, 0.1 g clavulanate; IV inf 3 g ticarcillin, 0.1 g clavulanate; powder for inj 3 g ticarcillin, 0.1 g clavulanate

Administer:

• Product after C&S, give ≥q1hr before bactericidal anti-infectives, change IV site q48hr

Intermittent IV INF route

• After diluting ≤3.1 g/13 ml of sterile water or NaCl (200 mg/ml), shake; may further dilute in ≥50-100 ml NS, D_5W, or LR sol and run over ½ hr

Y-site compatibilities: Allopurinol, amifostine, amikacin, anidulafungin, atropine, aztreonam, bivalirudin, bumetanide, ceFAZolin, cefepime, cefotaxime, cefOXitin, cefTAZidime, ceftizoxime, cefTRIAXone, cefuroxime, chloramphenicol, cimetidine, clindamycin, cyclophosphamide, cycloSPORINE, dexamethasone, dexmedetomidine, digoxin, diltiazem, diphenhydrAMINE, DOCEtaxel, DOPamine, DOXOrubicin liposome, doxycycline, enalaprilat, EPINEPHrine, esmolol, etoposide phosphate, famotidine, fenoldopam, filgrastim, fluconazole, furosemide, gemcitabine, gentamicin, granisetron, heparin, hydrocortisone, HYDROmorphone, imipenem/cilastatin, insulin, isoproterenol, labetalol, levofloxacin, lidocaine, linezolid, LORazepam, melphalan, meperidine, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, milrinone, morphine, nitroglycerin, nitroprusside, norepinephrine, ondansetron, palonosetron, pantoprazole, PEMEtrexed, penicillin G potassium, perphenazine, phenylephrine, procainamide, propofol, propranolol, ranitidine, remifentanil, sargramostim, sodium bicarbonate, tacrolimus, teniposide, theophylline, thiotepa, tirofiban, tobramycin, vasopressin, verapamil, vinorelbine, voriconazole

SIDE EFFECTS

CNS: Anxiety, seizures, confusion, drowsiness

GI: *Nausea, vomiting, diarrhea;* increased AST, ALT; abdominal pain, glossitis, colitis, pseudomembranous colitis, hepatotoxicity

HEMA: Anemia, increased bleeding time, bone marrow depression, granulocytopenia

INTEG: Rash, urticaria, toxic epidermal necrolysis, pain at injection site

META: Hypokalemia, hypernatremia

SYST: Anaphylaxis, Stevens-Johnson syndrome, overgrowth of organisms

PHARMACOKINETICS

IV: Peak 30-45 min, duration 4 hr, half-life 64-68 min, excreted in urine

INTERACTIONS

⚠ Increase: bleeding—anticoagulants

Increase: methotrexate level—methotrexate, uric acid, bilirubicin, BUN, creatining, alk, phos, LDH

Increase: ticarcillin concentrations—probenecid, sulfipyrazone

Decrease: antimicrobial effect of ticarcillin—tetracyclines, aminoglycosides IV, chloramphenicol, macrolides, sulfonamides

Decrease: effect—oral contraceptives, erythromycin

Drug/Lab Test

False positive: urine glucose, urine protein, Coombs' test

Increase: LFTs, sodium, eosinophils, INR bleeding time

T

Decrease: Hgb, potassium, platelets, WBC, granulocytes

NURSING CONSIDERATIONS

Assess:

- Infection: WBC, wound, temperature, sputum, urine, baseline and periodically

⚠ **Pseudomembranous colitis:** diarrhea, abdominal pain, fever, fatigue, anorexia; possible anemia, elevated WBC count, low serum albumin; stop product; usually either vancomycin or IV metroNIDAZOLE is given

⚠ **Serious skin reactions:** Stevens-Johnson syndrome, toxic epidermal necrolysis; anaphylaxis: wheezing, rash, laryngeal edema; have emergency equipment nearby

- Hepatic studies: AST, ALT
- Blood studies: WBC, RBC, Hct, Hgb, bleeding time, platelets, baseline and periodically
- Renal studies: BUN, creatinine, sodium, potassium
- Bowel pattern before, during treatment
- Skin eruptions after administration of penicillin to 1 wk after discontinuing product

Perform/provide:

- EPINEPHrine, suction, tracheostomy set, endotracheal intubation equipment
- Storage of reconstituted sol 12-24 hr at room temp, or 3-7 days refrigerated

Evaluate:

- Therapeutic response: Resolution of infection

Teach patient/family:

- To report persistent diarrhea with blood, pus, mucous, or fever
- That culture may be taken after completed course of medication
- To report sore throat, fever, fatigue (may indicate superinfection); CNS effects (anxiety, depression, hallucinations, seizures)
- To wear or carry emergency ID if allergic to penicillins
- To use alternative birth control method instead of hormonal

TREATMENT OF OVERDOSE:

Withdraw product, maintain airway, administer EPINEPHrine, O_2, IV corticosteroids for anaphylaxis

ticlopidine (Rx)

(tye-cloe'pi-deen)

Func. class.: Platelet aggregation inhibitor

Chem. class.: Thienopyridine compound

ACTION: Irreversible inhibition of platelet aggregation through antagonism of ADP

USES: Reducing the risk for stroke in high-risk patients

Unlabeled uses: Intermittent claudication, chronic arterial occlusion, subarachnoid hemorrhage, uremic patients with AV shunts/fistulas, open heart surgery, coronary artery bypass grafts, primary glomerulonephritis, sickle cell disease, diabetic retinopathy

CONTRAINDICATIONS: Hypersensitivity, severe hepatic disease, active bleeding, coagulopathy

Black Box Warning: Agranulocytosis, neutropenia, thrombocytopenia, thrombotic thrombocytopenic purpura (TTP)

Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, past hepatic disease, renal disease, increased bleeding risk, peptic ulcer disease, surgery

Black Box Warning: Anemia, hematologic disease

DOSAGE AND ROUTES

- **Adult: PO** 250 mg bid with food

Available forms: Tabs 250 mg

Administer:

- With food to decrease gastric symptoms
- Discontinue when absolute neutrophil count falls during treatment to <1200/

mm³ or platelets <80,000/mm³; may use methylPREDNISolone IV 20 mg to provide normal bleeding time in 2 hr

SIDE EFFECTS

CNS: Dizziness, headache, weakness
EENT: Tinnitus, epistaxis
GI: Nausea, vomiting, *diarrhea,* GI discomfort, cholestatic jaundice, hepatitis, increased cholesterol, LDL, VLDL, triglycerides
GU: Hematuria
HEMA: Bleeding (epistaxis, hematuria, conjunctival hemorrhage, GI bleeding), agranulocytosis, neutropenia, thrombocytopenia, thrombotic thombocytopenic purpura
INTEG: *Rash,* pruritus
META: Hypercholesterolemia, hypertriglyceridemia

PHARMACOKINETICS

Peak 1-3 hr; metabolized by liver; excreted in urine, feces; half-life increases with repeated dosing, initially 12-36 hr; antiplatelet effect 2-5 days; 98% protein binding

INTERACTIONS

Increase: levels of CYP2C19, CYP2DC substrates, phenytoin, fosphenytoin, ambrisentan, theophylline
Increase: bleeding tendencies—anticoagulants, salicylates, thrombolytics, NSAIDs, abciximab, eptifibatide, tirofiban, thrombin inhibitors, SSRIs, aspirin
Increase: effects of ticlopidine—cimetidine
Decrease: plasma levels of ticlopidine—antacids
Decrease: plasma levels of digoxin, cycloSPORINE
Drug/Herb
Increase: bleeding risk—ginger, ginkgo, garlic, feverfew, horse chestnut, green tea

NURSING CONSIDERATIONS

Assess:
• Hepatic studies: AST, ALT, bilirubin, creatinine with long-term therapy

Black Box Warning: Blood dyscrasias, bone marrow depression, do not use in those with a history of these conditions; blood studies: CBC; CBC q2wk × 3 mo, Hct, Hgb, PT with long-term therapy

⚠ Bleeding time at baseline and throughout treatment; levels may be 2-5× normal limit

Evaluate:
• Therapeutic response: absence of stroke

Teach patient/family:
• That blood work will be necessary during treatment
• To report any unusual bleeding to prescriber
• To report side effects such as diarrhea, skin rashes, subcut bleeding, signs of cholestasis (jaundiced skin and sclera, dark urine, light-colored stools)
• That product should be discontinued 10-14 days before surgery; not to double a missed dose
• That there are many product and herbal interactions to avoid all OTC products unless approved by prescriber

tigecycline (Rx)

(tye-ge-sye'kleen)

Tygacil

Func. class.: Broad-spectrum antiinfective

Chem. class.: Glycylcyclines

ACTION: Inhibits protein synthesis and phosphorylation in microorganisms; bacteriostatic structurally similar to the tetracyclines

USES: Complicated skin/skin-structure infections *(Escherichia coli, Enterococcus faecalis* [vancomycin-susceptible only] *Staphylococcus aureus, Streptococcus agalactiae, S. anginosus* group, *S. pyogenes, Bacteroides fragilis;* complicated intraabdominal infections *[Citrobacter freundii] Enterobacter cloacae, E. coli, Klebsiella oxytoca,*

T

K. pneumoniae, E. faecalis [vancomycin-susceptible only], *S. aureus* [methicillin-susceptible only], *S. anginosus* group, *B. fragilis, Bacteroides thetaiotaomicron, B. uniformis, B. vulgatus, Clostridium perfringens, Peptostreptococcus micros);* community-acquired pneumonia

CONTRAINDICATIONS:

Pregnancy (D), breastfeeding, children <18 yr, hypersensitivity to tigecycline

Precautions: Renal/hepatic disease, hypersensitivity to tetracyclines, ventilator-associated/hospital-acquired pneumonias

DOSAGE AND ROUTES

• **Adult: IV** 100 mg then 50 mg q12hr, **IV INF** given over 30-60 min q12hr; given for 5-14 days, depending on infection

Hepatic dose

• **Adult: IV** (Child-Pugh C) 100 mg then 25 mg q12hr

Available forms: Powder for inj, lyophilized 50 mg

Administer:

• Tigecycline allergy test before using, obtain C&S, do not begin treatment before results or if susceptible organism is strongly suspected

Intermittent IV INF route

• Reconstitute each vial with 5.3 ml of 0.9% NaCl or D_5 (10 mg/ml); swirl to dissolve; immediately withdraw 5 ml of reconstituted sol and add to 100-ml IV bag for inf (1 mg/ml); may be yellow or orange; if not, sol should be discarded; do not give if particulate matter is present, use a dedicated IV line or Y-site, flush with NS before and after use, give over ½ hr

Y-site compatibilities: Acyclovir, alfentanil, allopurinol, amifostine, amikacin, aminocaproic acid, aminophylline, amphotericin B liposome, ampicillin, ampicillin/sulbactam, argatroban, azithromycin, aztreonam, bivalirudin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, carmustine, caspofungin, ceFAZolin, cefepime, cefotaxime, cefoTEtan, cefOXitin, cefTAZidime, ceftizoxime, cefTRIAXone, cefuroxime, cimetidine, ciprofloxacin, cisatracurium, CISplatin, clindamycin, cyclophosphamide, cycloSPORINE, cytarabine, dacarbazine, DACTINomycin, DAPTOmycin, DAUNOrubicin hydrochloride, dexamethasone, dexmedetomidine, dexrazoxane, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, dolasetron, DOPamine, doripenem, DOXOrubicin hydrochloride, DOXOrubicin liposome, droperidol, enalaprilat, EPINEPHrine, eptifibatide, ertapenem, erythromycin, esmolol, etoposide, etoposide phosphate, famotidine, fenoldopam, fentaNYL, fluconazole, fludarabine, fluorouracil, foscarnet, fosphenytoin, furosemide, ganciclovir, gemcitabine, gentamicin, glycopyrrolate, granisetron, haloperidol, heparin, hydrocortisone, HYDROmorphone, ifosfamide, imipenem/cilastatin, insulin, irinotecan, isoproterenol, ketorolac, labetalol, lansoprazole, lepirudin, leucovorin, levofloxacin, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, melphalan, meperidine, meropenem, mesna, methohexital, methotrexate, methyldopa, metoclopramide, metoprolol, metroNIDAZOLE, midazolam, milrinone, mitoMYcin, mitoXANtrone, morphine, moxifloxacin, mycophenolate, nafcillin, nalbuphine, naloxone, nesiritide, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pamidronate, pancuronium, pantoprazole, PEMEtrexed, pemtamidine, pentazocin, PENTobarbital, PHENobarbital, phenylephrine, piperacillin/tazobactam, potassium acetate/chloride/phosphate, procainamide, prochlorperazine, promethazine, propofol, propranolol, ranitidine, remifentanil, rocuronium, sodium acetate/bicarbonate/phosphate, streptozocin, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiopental, thiotepa, ticarcillin/clavulanate, tirofiban, tobra-

mycin, topotecan, trimethoprim/sulfamethoxazole, vancomycin, vasopressin, vecuronium, vinBLAStine, vinCRIStine, vinorelbine, zidovudine, zoledronic acid

SIDE EFFECTS

CNS: Headache, dizziness, insomnia
CV: Hypo/hypertension, phlebitis
EENT: Tooth discoloration
GI: *Nausea, vomiting, diarrhea,* anorexia, constipation, dyspepsia, abdominal pain, hepatotoxicity, hepatic failure, pseudomembranous colitis
HEMA: Anemia, leukocytosis, thrombocytopenia
INTEG: *Rash,* pruritus, sweating, photosensitivity
META: Increased ALT, AST, BUN, lactic acid, alk phos, amylase; hyperglycemia, hypokalemia, hypoproteinemia, bilirubinemia
MISC: Back pain, fever, abnormal healing, abdominal pain, abscess, asthenia, infection, pain, peripheral edema, local reactions
RESP: Cough, dyspnea
SYST: Anaphylaxis

PHARMACOKINETICS

Not extensively metabolized, 22% of unchanged product excreted in urine, terminal half-life 42 hr, primarily biliary excreted, protein binding 71%-89%

INTERACTIONS

Increase: effect of warfarin
Decrease: effect of oral contraceptives
Drug/Lab Test
Increase: amylase, LFTs, alk phos, BUN, creatinine, LDH, WBC, INR, PTT, PT
Decrease: potassium, calcium, sodium, Hgb/Hct, platelets

NURSING CONSIDERATIONS

Assess:
⚠ **Pseudomembranous colitis:** diarrhea, abdominal pain, fever, fatigue, anorexia; possible anemia, elevated WBC level, low serum albumin; stop product; usually either vancomycin or IV metroNIDAZOLE is given
• Signs of anemia: Hct, Hgb, fatigue
• Blood studies: PT, CBC, AST, ALT, BUN creatinine
⚠ **Allergic reactions:** rash, itching, pruritus, angioedema
• Serious allergic skin reactions: Stevens-Johnson anaphylaxis
• Nausea, vomiting, diarrhea; administer antiemetic, antacids as ordered
• **Toxicity:** pseudotumor cerebri, photosensitivity, antianabolic actions (azotemia, BUN, hypophosphatemia, metabolic acidosis) tigecycline is structurally similar to tetracycline; pancreatitis, hyperamylasemia; (may be fatal) if these occur, discontinue, improvement usually occurs after product is discontinued
• **Overgrowth of infection:** fever, malaise, redness, pain, swelling, drainage, perineal itching, diarrhea, changes in cough or sputum
Perform/provide:
• Storage in tight, light-resistant container at room temp, diluted sol at room temp for up to 24 hr, 6 hr in vial, and remaining time in IV bag, ≤48 hr refrigerated
Evaluate:
• Therapeutic response: decreased temp, absence of lesions, negative C&S
Teach patient/family:
• To avoid sun exposure; sunscreen does not seem to decrease photosensitivity
⚠ To avoid pregnancy while taking this product; fetal harm may occur; avoid breastfeeding
• To report infection, increase in temp; to report burning, pain at inj site

T

timolol (Rx)

(tye'moe-lole)

Apo-Timol ♣, Novo-Timol ♣

Func. class.: Antihypertensive

Chem. class.: Nonselective β-blocker

ACTION: Competitively blocks stimulation of β-adrenergic receptor within vascular smooth muscle (decreases rate of SA node discharge, increases recovery time); slows conduction of AV node and decreases heart rate, which decreases O_2 consumption in myocardium; also decreases renin-aldosterone-angiotensin system; at high doses, inhibits β_2-receptors in bronchial system

USES: Mild to moderate hypertension, migraine prophylaxis, to decrease mortality after MI

Unlabeled uses: Tremors, angina pectoris

CONTRAINDICATIONS: Hypersensitivity to β-blockers, cardiogenic shock, heart block (2nd/3rd degree), sinus bradycardia, CHF, cardiac failure, severe COPD, asthma

Precautions: Pregnancy (C), breast-feeding, major surgery, diabetes mellitus, COPD, well-compensated heart failure, CAD, nonallergic bronchospasm, peripheral vascular disease, thyroid/renal/hepatic disease, diabetes mellitus

Black Box Warning: Abrupt discontinuation

DOSAGE AND ROUTES

Hypertension

- **Adult: PO** 10 mg bid or 20 mg/day, may increase by 10 mg q7days, max 60 mg/day
- **Geriatric patients: PO** initiate dose cautiously

Myocardial infarction

- **Adult: PO** 10 mg bid beginning 1-4 wk after MI

Migraine headache prevention

- **Adult: PO** 10 mg bid or 20 mg/day; may increase to 30 mg/day, 20 mg in AM, 10 mg in PM; discontinue if not effective after 8 wk

Available forms: Tabs 5, 10, 20 mg

Administer:

- PO before or immediately after meals, at bedtime; tab may be crushed or swallowed whole
- Reduced dosage in renal dysfunction

SIDE EFFECTS

CNS: *Insomnia, dizziness,* hallucinations, anxiety, fatigue, depression, headache

CV: Hypotension, bradycardia, CHF, edema, chest pain, claudication, angina, AV block, ventricular dysrhythmias

EENT: *Visual changes;* sore throat; *double vision;* dry, burning eyes

GI: *Nausea,* vomiting, ischemic colitis, diarrhea, *abdominal pain,* mesenteric arterial thrombosis, flatulence, constipation

GU: Impotence, urinary frequency

HEMA: Agranulocytosis, thrombocytopenia, purpura

INTEG: Rash, alopecia, pruritus, fever

META: Hypoglycemia

MUSC: *Joint pain, muscle pain*

RESP: Bronchospasm, *dyspnea,* cough, crackles, nasal stuffiness

PHARMACOKINETICS

Peak 1-2 hr; half-life 4 hr; metabolized by liver; excreted in urine, breast milk; protein binding <10%

INTERACTIONS

Increase: hypotension, bradycardia—hydrALAZINE, methyldopa, prazosin, anticholinergics, alcohol, reserpine, nitrates

Increase: effects of β-blockers, calcium channel blockers

Decrease: antihypertensive effects—NSAIDs, sympathomimetics, thyroid, salicylates

Decrease: hypoglycemic effects—insulin, sulfonylureas
Decrease: bronchodilation—theophyllines
Drug/Lab Test
Increase: renal, hepatic studies, uric acid
Interference: glucose, insulin tolerance test

NURSING CONSIDERATIONS

Assess:

Black Box Warning: **Abrupt discontinuation:** may result in myocardial ischemia, MI, severe hypotension, ventricular dysrhythmias in those with preexisting cardiovascular disease

- **Headaches:** location, severity, duration, frequency at baseline and throughout treatment
- I&O, weight daily
- B/P during initial treatment, periodically thereafter, pulse q4hr; note rate, rhythm, quality
- Apical/radial pulse before administration; notify prescriber of any significant changes
- Baselines of renal, hepatic studies before therapy begins
- Edema in feet, legs daily

Perform/provide:

- Dry storage at room temp; do not freeze

Evaluate:

- Therapeutic response: decreased B/P after 1-2 wk

Teach patient/family:

- To take before or immediately after meals

Black Box Warning: Not to discontinue product abruptly; to taper over 2 wk; may cause precipitate angina

- Not to use OTC products containing α-adrenergic stimulants (nasal decongestants, cold preparations) unless directed by prescriber
- To report bradycardia, dizziness, confusion, depression, fever, sore throat, SOB to prescriber
- To take pulse at home; advise when to notify prescriber
- To avoid alcohol, smoking, sodium intake
- To comply with weight control, dietary adjustments, modified exercise program
- To carry emergency ID to identify product, allergies
- To avoid hazardous activities if dizziness is present
- To report symptoms of **CHF:** difficulty breathing, especially on exertion or when lying down; night cough; swelling of extremities
- To take medication at bedtime; to wear support hose to minimize effect of orthostatic hypotension

TREATMENT OF OVERDOSE:

Lavage, IV atropine for bradycardia, IV theophylline for bronchospasm, digoxin, O_2, diuretic for cardiac failure, hemodialysis; administer vasopressor (norepinephrine)

timolol (ophthalmic)

(tie-moe'lol)

Istalol, Timoptic, Timoptic-XE

Func. class.: Antiglaucoma

Chem. class.: β-Blocker

ACTION: Can decrease aqueous humor and increase outflows

USES: Treatment of chronic open-angle glaucoma and ocular hypertension

CONTRAINDICATIONS: Hypersensitivity, AV block, heart failure, bradycardia, sick sinus syndrome, asthma
Precautions: Abrupt discontinuation, pregnancy, breastfeeding, children, COPD, depression, diabetes mellitus, myasthenia gravis, hyperthyroidism, pulmonary disease, angle-closure glaucoma

T

DOSAGE AND ROUTES

• **Adult:** Instill 1 drop in each affected eye bid (0.25% solution) initially; if no response, 1 drop in each affected eye bid (0.5% solution) or 1 drop of gel in each affected eye daily

Available forms: Ophthalmic solution 0.25, 0.5%; ophthalmic gel 0.25%, 0.5%

Administer:

• For ophthalmic use only

• Do not touch the tip of the dropper to the eye, fingertips, or other surface to prevent contamination

• Wash hands before and after use

• Tilt head back slightly and pull the lower eyelid down with the index finger to form a pouch; squeeze the prescribed number of drops into the pouch; close eyes to spread drops; to avoid excessive systemic absorption, apply finger pressure on the lacrimal sac for 1–2 min after use

• If >1 topical ophthalmic drug product is being used, the drugs should be administered at least 5 min apart

• Administer other topically applied ophthalmic medications at least 10 min before timolol gel-forming solution

• To avoid contamination or the spread of infection, do not use dropper for more than one person

• Some products contain the preservative benzalkonium chloride, which can be absorbed by soft contact lenses; remove contact lenses before administration of the solution; lenses may be reinserted 15 min after administration

• Decreased intraocular pressure can take several weeks, monitor IOP after a month

SIDE EFFECTS

CNS: Insomnia, headache, dizziness, anxiety, depression, headache, nightmares

CV: Palpitations, heart failure

EENT: Eye stinging/burning, tearing, photophobia, visual disturbances

GI: Nausea, dry mouth

PULM: Bronchospasm

PHARMACOKINETICS

Onset 30 min, peak 1-2 hr, duration 12-24 hr

INTERACTIONS

Increase: β-Blocking effect—oral β-blockers

Increase: Intraocular pressure reduction—topical miotics, dipivefrin, EPINEPHrine, carbonic anhydrase inhibitors; this may be beneficial

Increase: B/P, severe—when abruptly stopping cloNIDine

Increase: Depression of AV nodal conduction, bradycardia, or hypotension—adenosine, cardiac glycosides, disopyramide, other antiarrhythmics, class 1C antiarrhythmic drugs (flecainide, propafenone, moricizine, encainide quiNIDine, calcium-channel blockers, or drugs that significantly depress AV nodal conduction)

Increase: AV block nodal conduction, induce AV block—high doses of procainamide

Increase: Antihypertensive effect—other antihypertensives

NURSING CONSIDERATIONS

Assess:

⚠ **Systemic absorption:** When used in the eye, systemic absorption is common with the same adverse reactions and interactions

• Glaucoma: Monitor intraocular pressure

Evaluate:

• Decreasing intraocular pressure

Teach patient/family:

• That product is for ophthalmic use only

• Not to touch the tip of the dropper to the eye, fingertips, or other surface to prevent contamination

• To wash hands before and after use

• To tilt the head back slightly and pull the lower eyelid down with the index finger to form a pouch, squeeze the prescribed number of drops into the pouch, close eyes to spread drops

- To apply finger pressure on the lacrimal sac for 1–2 min following use to prevent excessive systemic absorption
- To administer drugs at least 5 min apart if more than one topical ophthalmic drug product is being used
- To administer other topically applied ophthalmic medications at least 10 min before timolol gel-forming solution
- To not use dropper for more than one person to avoid contamination or the spread of infection
- That some products contain the preservative benzalkonium chloride, which may be absorbed by soft contact lenses; to remove contact lenses before administration of the solution; that lenses may be reinserted 15 min after administration

tinidazole (Rx)

(tye-ni'da-zole)

Tindamax

Func. class.: Antiprotozoal

Chem. class.: Nitroimidazole derivative

ACTION: Interferes with DNA/RNA synthesis in protozoa

USES: Amebiasis, giardiasis, trichomoniasis

Unlabeled uses: *Bacteroides* sp., *Clostridium* sp., *Eubacterium* sp., *Fusobacterium* sp., *Peptococcus* sp., *Peptostreptococcus* sp., gingivitis, urethritis, *Veillonella* sp.

CONTRAINDICATIONS: Pregnancy, breastfeeding; hypersensitivity to this product or nitroimidazole derivative

Precautions: Children, geriatric patients, hepatic disease, CNS depression, blood dyscrasias, candidiasis, seizures, viral infection, alcoholism, pregnancy (C)

Black Box Warning: Secondary malignancy

DOSAGE AND ROUTES

Intestinal amebiasis/amebic involvement of the liver

- **Adult: PO** 2 g daily × 3 days
- **Child ≥3 yr/adolescent: PO** 50 mg/kg/day × 3 days, max 2 g/day

Giardiasis

- **Adult: PO** 2 g as a single dose
- **Child ≥3 yr: PO** 50 mg/kg as a single dose, max 2 g

Trichomoniasis

- **Adult: PO** 2 g as a single dose

Bacterial vaginosis

- **Adult (nonpregnant woman): PO** 2 g/day × 2 days with food or 1 g/day × 5 days with food

Available forms: Tabs 250, 500 mg

Administer:

- Tabs can be crushed and mixed with artificial cherry syrup for children
- With food to increase plasma concentrations, minimize epigastric distress and other GI effects

SIDE EFFECTS

CNS: *Dizziness, headache,* seizures, *peripheral neuropathy,* malaise, fatigue

GI: *Nausea, vomiting,* anorexia, increased AST/ALT, constipation, abdominal pain, indigestion, altered taste

HEMA: Leukopenia, neutropenia

INTEG: Pruritus, urticaria, *rash,* oral candidiasis

SYST: Angioedema, cramping

PHARMACOKINETICS

Peak 1½ hr; metabolized extensively in liver; excreted unchanged (20%-25%) in urine, (12%) feces; half-life 12-14 hr; crosses blood-brain barrier

INTERACTIONS

- Do not use within 2 wk of disulfiram

Increase: tinidazole action—CYP3A4 inhibitors (cimetidine, ketoconazole): increased action of tinidazole

Increase: action of anticoagulants, cyclosporine, tacrolimus, fluorouracil, hydantoins, lithium

T

Decrease: tinidazole action—CYP3A4 inducers (PHENobarbital, rifampin, phenytoin); cholestyramine, oxytetracycline: decreased action of tinidazole

Drug/Herb

Increase or decrease: tinidazole level—St. John's wort

Drug/Lab Test

Increase: triglycerides, LDH, AST/ALT, glucose

Decrease: WBCs

NURSING CONSIDERATIONS

Assess:

- **Giardiasis:** obtain 3 stool samples several days apart beginning q3-4wk after treatment
- **Amebic liver abscess:** Monitor CBC, ESR, amebic gel diffusion test, ultrasound; also total and differential leukocyte count

Black Box Warning: Secondary malignancy: avoid unnecessary use

- Signs of infection, anemia
- Bowel pattern before, during treatment

Evaluate:

- Therapeutic response: decrease in infection as evidenced by negative culture

Teach patient/family:

- To take with food to increase plasma concentrations, minimize epigastric distress and other GI effects; not to use alcoholic beverages during or for 3 days after treatment
- **Trichomoniasis:** both partners should be treated at the same time
- To avoid alcohol, may cause disulfiram reaction
- To avoid doing hazardous activities until reaction is known
- That product causes taste
- Not to use OTC, Rx, or herbal products unless approved by prescriber

⚠ HIGH ALERT

tinzaparin (Rx)

(tin-zay-par'in)

Innohep

Func. class.: Anticoagulant

Chem. class.: Unfractionated porcine heparin

ACTION: Increases the inhibitory effect of antithrombin factor Xa, thrombin

USES: Treatment of DVT, PE after abdominal, knee, or hip surgery or after knee or hip replacement

Unlabeled uses: Antiphospholipid antibody syndrome, arterial thromboembolism prophylaxis, cerebral thromboembolism, DVT prophylaxis, PE prophylaxis, thrombosis prophylaxis

CONTRAINDICATIONS: Hypersensitivity to this product, heparin, pork or benzyl alcohol, sulfites; hemophilia, leukemia with bleeding, peptic ulcer disease, thrombocytopenic purpura, heparin-induced thrombocytopenia

Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, alcoholism, severe renal/hepatic disease, blood dyscrasias; severe, uncontrolled hypertension; subacute bacterial endocarditis, acute nephritis; geriatric patients >70 yr (renal disease with DVT/PE)

Black Box Warning: Spinal/epidural anesthesia, lumbar puncture

DOSAGE AND ROUTES

Treatment of DVT

- **Adult: SUBCUT** 175 anti-Xa international units/kg/day ≥6 days and until adequate anticoagulation with warfarin (therapeutic INR ≥2 for 2 consecutive days)

Prophylaxis of DVT in orthopedic procedures (unlabeled)
• **Adult:** 75 anti-Xa units/kg/day started 12-24 hr after surgery
Prophylaxis of DVT/ thromboembolism/PE (unlabeled)
• **Adult:** 3500 anti-Xa units (50 anti-Xa units/kg) daily beginning 1-2 hr prior to surgery and continued for 5-10 days
Available forms: Inj 20,000 international units/1 ml
Administer:
• Only after screening patient for bleeding disorders
• For 6 days, until warfarin has been given to result in adequate coagulation
• SUBCUT only; do not give IM
• To recumbent patient; give SUBCUT; rotate inj sites (left/right anterolateral, left/right posterolateral abdominal wall)
• Insert whole length of needle into skin fold held with thumb and forefinger
⚠ Only this product when ordered; not interchangeable with heparin (unfractionated) or LMWHs
• At same time each day to maintain steady blood levels
• Do not massage area or aspirate when giving SUBCUT inj
• Do not mix with other products or inf fluids
• Alternate inj sites
• For excessive bruising at inj site, may use ice before SUBCUT inj

SIDE EFFECTS

CNS: Fever, confusion, dizziness, insomnia
CV: Angina, dysrhythmias, peripheral edema, tachycardia, hypo/hypertension
GI: Nausea, constipation, flatulence, dyspepsia, hepatitis
GU: UTI, hematuria, urinary retention, dysuria
HEMA: Hemorrhage, anemia, thrombocytopenia, bleeding
INTEG: Ecchymosis, inj site reaction
MISC: Headache, chest/back pain, hypersensitivity
SYST: Stevens-Johnson syndrome

PHARMACOKINETICS

Onset 2-3 hr, max antithrombin activity (3-5 hr), elimination half-life 4.5 hr

INTERACTIONS

Increase: action of tinzaparin—oral anticoagulants, salicylates, thrombolytics, NSAIDs, platelet inhibitors, ticlopidine, clopidogrel

NURSING CONSIDERATIONS

Assess:
Black Box Warning: Spinal/epidermal anesthesia, lumbar puncture: monitor neurological impairment; if impairment occurs, urgent treatment needed
• Blood studies (Hct, platelets, occult blood in stools), anti-Xa; thrombocytopenia may occur
• **Bleeding:** gums, petechiae, ecchymosis, black tarry stools, hematuria, decreased Hct, Hgb
• Hypersensitivity (fever, urticaria, chills); report to prescriber
• Inj site reactions; do not use IM inj
Perform/provide:
• Storage at 77° F (25° C); do not freeze
Evaluate:
• Therapeutic response: resolution of DVT
Teach patient/family:
• To report any signs of bleeding: gums, under skin, urine, stools

TREATMENT OF OVERDOSE:

Protamine 1 mg/100 anti-Xa international units of tinzaparin

tioconazole vaginal antifungal
See Appendix B

tiotropium (Rx)

(ty-oh'tro-pee-um)

Spiriva HandiHaler

Func. class.: Anticholinergic, bronchodilator

Chem. class.: Synthetic quaternary ammonium compound

Do not confuse:
Spiriva/Inspra

ACTION: Inhibits interaction of acetylcholine at receptor sites on the bronchial smooth muscle, thereby resulting in decreased cGMP and bronchodilation

USES: COPD; for the long-term treatment and once-daily maintenance of bronchospasm associated with COPD, including chronic bronchitis and emphysema

CONTRAINDICATIONS: Hypersensitivity to this product, atropine or its derivatives
Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, closed-angle glaucoma, prostatic hypertrophy, bladder neck obstruction, renal disease

DOSAGE AND ROUTES

• **Adult: INH** content of 1 cap/day (18 mcg) using HandiHaler inhalation device
Available forms: Powder for INH 18 mcg in blister packs containing 6 caps with inhaler; 30 caps with inhaler
Administer:
Inhalation route
• Caps are for INH only; do not swallow
• Immediately before administration, peel back foil until cap is visible and to "stop" line; remove cap from blister cavity; open dust cap of HandiHaler by pulling upward, then open mouthpiece; place cap in center chamber; firmly close mouthpiece until it clicks, leaving dust cap open
• When finished taking dose, remove used capsule and dispose of it; close mouthpiece and dust cap; store
• Rinse mouth after use

SIDE EFFECTS

CNS: Depression, paresthesia
CV: Chest pain, increased heart rate
EENT: Dry mouth, blurred vision, glaucoma
GI: Vomiting, abdominal pain, constipation, dyspepsia
GU: Urinary difficulty, urinary retention, UTI
INTEG: Rash, angioedema
MISC: Candidiasis, flulike syndrome, herpes zoster, infections, angina pectoris
MS: Arthritis myalgic leg/skeletal pain
RESP: *Cough, sinusitis, upper respiratory tract infection,* epistaxis, pharyngitis

PHARMACOKINETICS

Half-life 5-6 days in animals, does not cross blood-brain barrier, very little metabolized in the liver, excreted in urine, 72% protein binding

INTERACTIONS

• Anticholinergics: avoid use with other anticholinergics
Drug/Lab Test
Increase: cholesterol, glucose

NURSING CONSIDERATIONS

Assess:
• **Respiratory status:** dyspnea, rate, breath sounds before and during treatment; pulmonary function tests at baseline and periodically; upper respiratory infections, cough, sinusitis
• Tolerance over long-term therapy; dose may have to be increased or changed
• Patient's ability to use HandiHaler
Evaluate:
• Therapeutic response: ability to breathe easier

Teach patient/family:
- Signs of closed-angle glaucoma (eye pain, blurred vision, visual halos)
- That product is used for long-term maintenance, not for immediate relief of breathing problems; that effect takes 20 min, lasts 24 hr
- To avoid getting the powder in the eyes; may cause blurred vision and pupil dilation
- To hold HandiHaler with mouthpiece upward; to press button in once, completely, and release; this allows for medication to be released
- To breathe out completely; not to breathe into mouthpiece at any time
- To raise device to mouth and close lips tightly around mouthpiece
- With head upright, to breathe in slowly and deeply, but allow the cap to vibrate; to breathe until the lungs fill; to hold breath and remove mouthpiece; to resume normal breathing
- To rinse mouth after use; to use hard candy or regular oral hygiene to reduce dry mouth
- To report immediately blurred vision, eye pain, halos
- To keep caps in sealed blisters before use, store at room temperature

tipranavir (Rx)

(ti-pran'a-veer)

Aptivus

Func. class.: Antiretroviral

Chem. class.: Protease inhibitor

ACTION: Inhibits human immunodeficiency virus (HIV) protease, thereby preventing the maturation of the virus

USES: HIV in combination with other antiretrovirals

CONTRAINDICATIONS: Hypersensitivity

Black Box Warning: Hepatic disease (Child-Pugh B, C)

Precautions: Pregnancy (C), breastfeeding, children, renal disease, history of renal stones, sulfa allergy, hemophilia, diabetes mellitus, pancreatitis, alcoholism, immune reconstitution syndrome, surgery, trauma, infection

Black Box Warning: Intracranial bleeding, hepatitis

DOSAGE AND ROUTES

Reduce dose with mild to moderate hepatic impairment and ketoconazole coadministration

- **Adult: PO** 500 mg coadministered with ritonavir 200 mg bid with food
- **Adolescent and child ≥2 yr: PO** 14 mg/kg given with ritonavir 6 mg/kg bid or 375 mg/m^2 given with ritonavir 150 mg/m^2 bid, max 500 mg with ritonavir 200 mg bid

Available forms: Caps 250 mg; oral sol 100 mg/ml

Administer:
- Swallow cap whole; do not break, crush, chew
- After meals
- In equal intervals around the clock to maintain blood levels
- Give oral sol using calibrated dosing syringe or 5-ml oral syringe provided

SIDE EFFECTS

CNS: *Headache, insomnia,* dizziness, somnolence, fatigue, *fever,* intracranial bleeding

GI: *Diarrhea, abdominal pain, nausea, vomiting,* anorexia, dry mouth, hepatitis B or C, fatalities when given with ritonavir, pancreatitis

GU: Nephrolithiasis

INTEG: *Rash,* urticaria, lipodystrophy, serious rash

MS: Pain

OTHER: Asthenia, insulin-resistant hyperglycemia, *hyperlipidemia,* ketoacidosis

T

PHARMACOKINETICS

Terminal half-life 6 hr, peak 3 hr, plasma protein binding 99.9%, steady state 7-10 days, metabolism CYP3A4, 80% fecal excretion

INTERACTIONS

⚠ **Life-threatening dysrhythmias:** amiodarone, astemizole, cisapride, ergots, flecainide, midazolam, pimozide, propafenone, quiNIDine, rifabutin, rifampin, terfenadine, triazolam

Increase: **myopathy, rhabdomyolysis**—HMG-CoA reductase inhibitors (lovastatin, simvastatin)

Increase: tipranavir levels—ketoconazole, delavirdine, itraconazole

Increase: levels of both products—clarithromycin, zidovudine

Increase: levels of tipranavir—oral contraception

Decrease: tipranavir levels—rifamycins, fluconazole, nevirapine, efavirenz

Drug/Herb

Decrease: tipranavir levels—St. John's wort; avoid concurrent use

Drug/Food

Decrease: tipranavir absorption—grapefruit juice; high-fat, high-protein foods

Drug/Lab Test

Increase: AST/ALT, cholesterol, blood glucose, amylase, lipase, triglycerides

NURSING CONSIDERATIONS

Assess:

• Signs of infection, anemia; presence of other sexually transmitted diseases

Black Box Warning: Hepatic studies: ALT, AST; total bilirubin, amylase; all may be elevated, discontinue in those with hepatic insufficiency or hepatitis or AST/ALT 10 × upper limit or AST/ALT 5-10 × ULN and total bilirubin 2.5 × ULN

• **HIV:** Viral load, CD4, plasma HIV RNA, serum cholesterol profile, serum triglycerides during treatment

• Bowel pattern before, during treatment; if severe abdominal pain with bleeding occurs, product should be discontinued; monitor hydration

• **Serious rash:** if serious rash occurs, product should be discontinued

• Immune reconstitution syndrome: has been reported with combination antiretroviral therapy, patients may develop pain (MAC, CMV, PcP, TB) and autoimmune disease months after treatment

• Intracranial bleeding: more common in those with trauma, surgery, or those taking antiplatelets or anticoagulants

• Cushingoid symptoms: buffalo hump, facial/peripheral wasting, breast enlargement, central obesity

Perform/provide:

• Storage for caps in refrigerator before use; after opening, store at room temp; use within 60 days

• Storage for oral sol at room temp; use within 60 days after opening bottle

Evaluate:

• Therapeutic response: improving CD4 counts, viral load

Teach patient/family:

• To take as prescribed; if dose is missed, to take as soon as remembered up to 1 hr before next dose; not to double dose

• That product must be taken in equal intervals around the clock to maintain blood levels for duration of therapy

⚠ That hyperglycemia may occur; to watch for increased thirst, weight loss, hunger, dry, itchy skin; to notify prescriber

• That product does not cure AIDS, only controls symptoms; not to donate blood

⚠ HIGH ALERT

tirofiban (Rx)

(tie-roh-fee'ban)

Aggrastat

Func. class.: Antiplatelet

Chem. class.: Glycoprotein IIb/IIIa inhibitor

ACTION: Antagonist of platelet glycoprotein (GP) IIb/IIIa receptor that prevents binding of fibrinogen and von Wil-

lebrand's factor, which inhibits platelet aggregation

USES: Acute coronary syndrome in combination with heparin

CONTRAINDICATIONS: Hypersensitivity, active internal bleeding, stroke, major surgery, severe trauma within 30 days, intracranial neoplasm, aneurysm, hemorrhage, acute pericarditis, platelets $<100{,}000/mm^3$, history of thrombocytopenia, coagulopathy, systolic B/P >180 mm Hg or diastolic B/P >110 mm Hg

Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, renal disease, bleeding tendencies, hypertension, platelets $<150{,}000/mm^3$

DOSAGE AND ROUTES

- **Adult: IV** 0.4 mcg/kg/min × 30 min then 0.1 mcg/kg/min for 12-24 hr after angioplasty or atherectomy

Renal dose

- **Adult: IV** CCr <30 ml/min, 0.2 mcg/kg/min × 30 min then 0.05 mcg/kg/min during angiography and for ≤24 hr after angioplasty

Available forms: Inj 50 ml vials; inj premixed bag 50 mcg/ml in 100, 250 ml

Administer:

Intermittent IV INF route

- Dilute inj: withdraw and discard 100 ml from 500-ml bag of sterile 0.9% NaCl or D_5W and replace this vol with 100 ml of tirofiban inj from 2 vials
- Tirofiban inj for sol is premixed in containers of 500-ml 0.9% NaCl (50 mg/ml), infuse over 30 min
- Minimize other arterial/venous punctures; IM inj, catheter use, intubation, to reduce bleeding risk

Y-site compatibilities: Acyclovir, alfentanil, allopurinol, amifostine, amikacin, aminocaproic acid, aminophylline, amiodarone, ampicillin, ampicillin/sulbactam, anidulafungin, argatroban, arsenic trioxide, atracurium, atropine, azithromycin, aztreonam, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, capreomycin, CARBOplatin, carmustine, caspofungin, ceFAZolin, cefepime, cefotaxime, cefoTEtan, cefOXitin, cefTAZidime, ceftizoxime, cefTRIAXone, cefuroxime, chloramphenicol, chlorproMAZINE, cimetidine, ciprofloxacin, cisatracurium, CISplatin, clindamycin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, dexmedetomidine, dexrazoxane, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, dolasetron, DOPamine, doxacurium, DOXOrubicin, DOXOrubicin liposome, doxycycline, droperidol, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, eptifibatide, ertapenem, erythromycin, esmolol, etoposide, etoposide phosphate, famotidine, fenoldopam, fentaNYL, fluconazole, fludarabine, fluorouracil, foscarnet, fosphenytoin, furosemide, ganciclovir, gemcitabine, gentamicin, glycopyrrolate, granisetron, haloperidol, heparin, hydrALAZINE, hydrocortisone, HYDROmorphone, IDArubicin, ifosfamide, imipenem/cilastatin, insulin, irinotecan, isoproterenol, ketorolac, labetalol, leucovorin, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, melphalan, meperidine, meropenem, mesna, methylhexital, methotrexate, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, midazolam, milrinone, mitoXANtrone, morphine, mycophenolate, nafcillin, nalbuphine, naloxone, nesiritide, niCARdipine, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pamidronate, pancuronium, pantoprazole, PEMEtrexed, PENTobarbital, PHENobarbital, phentolamine, phenylephrine, piperacillin/tazobactam, potassium acetate, potassium chloride/phosphates, procainamide, prochlorperazine, promethazine, propranolol, quinupristin/dalfopristin, ranitidine, remifentanil, rocuronium, sodium acetate/bicarbonate,

streptozocin, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiopental, thiotepa, ticarcillin/clavulanate, tigecycline, tobramycin, topotecan, vancomycin, vasopressin, vecuronium, verapamil, vinBLAStine, vinCRIStine, vinorelbine, voriconazole, zidovudine, zoledronic acid

SIDE EFFECTS

CNS: Dizziness, headache
CV: Bradycardia, hypotension
GI: Nausea, vomiting
HEMA: Bleeding, thrombocytopenia
INTEG: *Rash*
MISC: Dissection, edema, pain in legs/pelvis, sweating
SYST: Anaphylaxis

PHARMACOKINETICS

Half-life 2 hr; excretion via urine, feces; plasma clearance 20%-25% lower in geriatric patients with CAD; renal insufficiency decreases plasma clearance

INTERACTIONS

Increase: bleeding—aspirin, heparin, NSAIDs, abciximab, eptifibatide, clopidogrel, ticlopidine, dipyridamole, cefamandole, cefoTEtan, cefoperazone, valproic acid, heparins, thrombin inhibitors, SSRIs, SNRIs

NURSING CONSIDERATIONS

Assess:

• **Multiple sclerosis, spinal cord injury:** muscle spasms, dizziness, drowsiness, difficulty moving, coordination, balance

⚠ **Bleeding:** platelet counts, Hct, Hgb before treatment, within 6 hr of loading dose, and at least daily thereafter; watch for bleeding from puncture sites, catheters or in stools, urine; discontinue if platelets $<100{,}000/mm^3$

Evaluate:

• Therapeutic response: treatment of acute coronary syndrome

Teach patient/family:

• That it is necessary to quit smoking to prevent excessive vasoconstriction
• About signs, symptoms of bleeding and low platelets
• That there are many product and herbal interactions

tiZANidine (Rx)

(ti-za'nih-deen)
Zanaflex
Func. class.: Skeletal muscle relaxant, α_2-adrenergic agonist
Chem. class.: Imidazoline

Do not confuse:
tiZANidine/tiaGABine

ACTION: Increases presynaptic inhibition of motor neurons and reduces spasticity by α_2-adrenergic agonism

USES: Acute/intermittent management of increased muscle tone associated with spasticity, symptoms of MS
Unlabeled uses: Tension headache, low back pain, trigeminal neuralgia

CONTRAINDICATIONS: Hypersensitivity
Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, hypotension, renal/hepatic disease

DOSAGE AND ROUTES

• **Adult: PO** 8 mg q6-8hr, max 36 mg/24 hr

Renal dose

• **Adult: PO** CCr <25 ml/min, start with lower dose

Available forms: Tabs 2, 4 mg; caps 2, 4, 6 mg

Administer

• Consistently either with/without food; food may affect absorption
• Titrate doses carefully
• Avoid use with other CNS depressants

SIDE EFFECTS

CNS: Somnolence, dizziness, speech disorder, dyskinesia, nervousness, hallucination, psychosis
CV: Hypotension, bradycardia
GI: Dry mouth, vomiting, increased ALT, abnormal LFTs, constipation
OTHER: Blurred vision, urinary frequency, pharyngitis, rhinitis, tremor, rash, muscle weakness

PHARMACOKINETICS

Completely absorbed, widely distributed, peak 1-2 hr, duration 3-6 hr, half-life 2.5 hr, protein binding 30%, metabolized by liver; excreted in urine, feces

INTERACTIONS

Increase: CNS depression—alcohol, other CNS depressants
Increase: tiZANidine levels—other CYP1A2 inhibitors (acyclovir, amiodarone, famotidine, mexiletine, enoxacin, norfloxacin, propafenone, tacrine, verapamil, zileuton, oral contraceptives ciprofloxacin), fluvoxaMINE; avoid concurrent use
Increase: hypotension—antihypertensives
Increase: effect of rasagiline
Drug/Herb
Increase: CNS depression—kava, St. John's wort
Drug/Lab Test
Increase: alk phos, AST, ALT, serum glucose

NURSING CONSIDERATIONS

Assess:
• **Muscle spasticity** at baseline and throughout treatment
• **Hypotension;** gradual dosage increase should lessen hypotensive effects; have patient rise slowly from supine to upright; watch those patients receiving antihypertensives for increased effects
• Increased sedation, dizziness, hallucinations, psychosis; product may need to be discontinued
• Vision by ophthalmic exam; corneal opacities may occur
• Hepatic studies: 1, 3, 6 mo during treatment and periodically thereafter
Evaluate:
• Therapeutic response: decreased muscle spasticity
Teach patient/family:
• To rise slowly from lying or sitting to upright position to prevent orthostatic hypotension
• To ask for assistance if dizziness, sedation occur; to avoid drinking alcohol; to avoid operating machinery, driving until effects known
• To discontinue gradually

tobramycin (Rx)

(toe-bra-mye'sin)
BETHKIS
Func. class.: Antiinfective
Chem. class.: Aminoglycoside

ACTION: Interferes with protein synthesis in bacterial cell by binding to ribosomal subunits, thereby causing inaccurate peptide sequences to form in protein chain causing bacterial death

USES: Severe systemic infections of CNS, respiratory, GI, urinary tract, bone, skin, soft tissues caused by *Pseudomonas aeruginosa, Escherichia coli, Enterobacter, Providencia, Citrobacter, Staphylococcus, Proteus, Klebsiella, Serratia;* cystic fibrosis (nebulizer) for *Pseudomonas aeruginosa*

CONTRAINDICATIONS: Hypersensitivity to aminoglycosides

Black Box Warning: Pregnancy (D), severe renal disease

Precautions: Breastfeeding, geriatric patients, neonates, mild renal disease, myasthenia gravis, Parkinson's disease

Black Box Warning: Hearing deficits, neuromuscular disease

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DOSAGE AND ROUTES

• **Adult: IM/IV** 3 mg/kg/day in divided doses q8hr; may give up to 6 mg/kg/day in divided doses q8-12hr; once-daily dosing (pulse dosing) (unlabeled) **IV** 5-7 mg/kg, dosing intervals determined using nomogram, based on random levels drawn 8-12 hr after 1st dose

• **Child: IM/IV** 6-7.5 mg/kg/day in 3-4 equal divided doses

• **Child ≥6 yr: NEB** 300 mg bid in repeating cycles of 28 days on/28 days off of product; give **INH** over 10-15 min using a handheld PARI LC PLUS reusable nebulizer with DeVilbiss Pulmo-Aid compressor

• **Neonate <1 wk: IM/IV** ≤4 mg/kg/day divided q12hr

Cystic fibrosis with *Pseudomonas aeruginosa*

• **Adult/adolescent/child: IV** 2.5-3.3 mg/kg q8hr, **neb** 300 mg via inhalation bid × 28 days, then 28 days after

Renal dose

• **Adult: IM/IV** 1 mg/kg then dose determined by blood levels, may be removed by dialysis

Available forms: Inj 10, 40 mg/ml; powder for inj 1.2 g; neb sol 300 mg/5 ml

Administer:

• After obtaining specimen for C&S; begin treatment before results

• Product in evenly spaced doses to maintain blood level; separate aminoglycosides and penicillins by ≥1 hr

• Use only on susceptible organisms to prevent development of product-resistant bacteria

IM route

• IM inj in large muscle mass; rotate inj sites, aspirate

• Draw peak 1 hr after dose, trough right before next dose; absorption erratic

Nebulizer route

• Give as close to q12hr apart as possible; do not use <6 hr apart

• Do not mix with dornase alfa in nebulizer

• Have patient inhale while sitting or standing, breathe normally through mouthpiece; may use noseclips; use over 10-15 min

• The sol for nebulization is for inhalation only

Intermittent IV INF route

• Visually inspect sol, do not use if discolored or particulate is present

• **Vantage vials** are for IV only and only for exactly 60 or 80 mg

• Diluted in 50-100 ml 0.9% NaCl D_5W ($D_{10}W$, Ringer's, LR), infuse over 20-60 min, volume for pediatric patients needs and should be sufficient to allow for 20-60 min infusion

Y-site compatibilities: Acyclovir, aldesleukin, alfentanil, alprostadil, amifostine, aminophylline, amiodarone, amsacrine, anidulafungin, ascorbic acid, atracurium, atropine, aztreonam, bivalirudin, bretylium, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, caspofungin, chloramphenicol, cimetidine, ciprofloxacin, cisatracurium, CISplatin, clindamycin, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexmedetomidine, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, doripenem, doxacurium, DOXOrubicin hydrochloride, DOXOrubicin liposome, doxycycline, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, epoetin alfa, ertapenem, esmolol, etoposide, etoposide phosphate, famotidine, fenoldopam, fentaNYL, filgrastim, fluconazole, fludarabine, fluorouracil, foscarnet, furosemide, gemcitabine, gentamicin, glycopyrrolate, granisetron, HYDROmorphone, ifosfamide, imipenem/cilastatin, isoproterenol, ketorolac, labetalol, levofloxacin, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, melphalan, meperidine, metaraminol, methicillin, methotrexate, methoxamine, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, miconazole,

midazolam, milrinone, minocycline, mitoXANtrone, morphine, moxalactam, multiple vitamins, nafcillin, nalbuphine, naloxone, niCARdipine, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxaliplatin, oxytocin, PACLitaxel, palonosetron, pantoprazole, papaverine, penicillin G, pentazocine, perphenazine, PHENobarbital, phentolamine, phenylephrine, phytonadione, potassium chloride, procainamide, prochlorperazine, promethazine, propranolol, protamine, pyridoxime, quinupristin/dalfopristin, ranitidine, remifentanil, riTUXimab, rocuronium, sodium acetate/bicarbonate, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiamine, thiotepa, ticarcillin/clavulanate, tigecycline, tirofiban, tolazoline, trastuzumab, trimethaphan, urokinase, vancomycin, vasopressin, vecuronium, verapamil, vinCRIStine, vinorelbine, voriconazole, zidovudine

SIDE EFFECTS

CNS: Confusion, depression, numbness, tremors, seizures, muscle twitching, neurotoxicity, dizziness, vertigo
CV: Hypo/hypertension, palpitation
EENT: Ototoxicity, deafness, visual disturbances, tinnitus
GI: *Nausea, vomiting, anorexia;* increased ALT, AST, bilirubin, hepatomegaly, hepatic necrosis, splenomegaly
GU: Oliguria, hematuria, renal damage, azotemia, renal failure, nephrotoxicity
HEMA: Agranulocytosis, thrombocytopenia, leukopenia, eosinophilia, anemia
INTEG: *Rash,* burning, urticaria, dermatitis, alopecia

PHARMACOKINETICS

Plasma half-life 2-3 hr, prolonged in neonates; not metabolized; excreted unchanged in urine; crosses placental barrier; poor penetration into CSF
IM: Onset rapid, peak 1 hr, duration 8 hr
IV: Onset immediate, peak 30 min, duration 8 hr

INTERACTIONS

Increase: ototoxicity, neurotoxicity, nephrotoxicity—other aminoglycosides, amphotericin B, polymyxin, vancomycin, ethacrynic acid, furosemide, mannitol, methoxyflurane, CISplatin, cephalosporins, bacitracin, acyclovir, penicillins, cidofovir

Drug/Lab Test

Increase: eosinophils, BUN, creatinine, AST, ALT, LDH, alk phos
Decrease: potassium, calcium, sodium, magnesium, WBC, granulocytes, platelets

NURSING CONSIDERATIONS

Assess:

- Weight before treatment; dosage is usually based on ideal body weight but may be calculated on actual body weight
- I&O ratio, urinalysis daily for proteinuria, cells, casts; report sudden change in urine output
- VS during inf; watch for hypotension, change in pulse
- IV site for thrombophlebitis, including pain, redness, swelling q30min; change site if needed; apply warm compresses to discontinued site
- Serum aminoglycoside conc; serum peak drawn at 30-60 min after IV inf or 60 min after IM inj, trough drawn just before next dose, peak 4-10 mcg/ml, trough 0.5-2 mcg/ml

Black Box Warning: Renal impairment: CCr, BUN, serum creatinine; lower dosage should be given in renal impairment (CCr <80 ml/min); monitor electrolytes: potassium, sodium, chloride, magnesium monthly if patient receiving long-term therapy

Black Box Warning: Deafness by audiometric testing; ringing, roaring in ears; vertigo; assess hearing before, during, after treatment

- **Overgrowth of infection:** fever, malaise, redness, pain, swelling, perineal itching, diarrhea, stomatitis, change in cough, sputum
- **Vestibular dysfunction:** nausea,

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vomiting, dizziness, headache; product should be discontinued if severe

Perform/provide:

- Adequate fluids of 2-3 L/day unless contraindicated to prevent irritation of tubules
- Flush of IV line with NS or D_5W after inf
- Supervised ambulation, other safety measures with vestibular dysfunction

Evaluate:

- Therapeutic response: absence of fever, draining wounds, negative C&S after treatment

Teach patient/family:

- To report headache, dizziness, symptoms of overgrowth of infection, renal impairment

Black Box Warning: To report loss of hearing; ringing, roaring in ears; feeling of fullness in head

Black Box Warning: To notify prescriber if pregnancy is planned or suspected; pregnancy (D)

Nebulizer

- To use other therapies first, then tobramycin

TREATMENT OF OVERDOSE:

Hemodialysis; monitor serum levels of product

tobramycin ophthalmic

See Appendix B

tocilizumab (Rx)

(toe'si-liz'oo-mab)

Actemra

Func. class.: DMARDs (disease-modifying antirheumatoid drugs)/tumor necrosis factor (TNF) modifier

ACTION:

Interleukin-6 (IL-6) receptor inhibiting monoclonal antibody

USES:

Rheumatoid arthritis, active systemic juvenile idiopathic arthritis

CONTRAINDICATIONS:

Hypersensitivity

Precautions: Breastfeeding, pregnancy (C); risk for GI perforation, active hepatic disease, severe neutropenia/thrombocytopenia, demyelinating disorders

Black Box Warning: Invasive fungal infection, active TB

DOSAGE AND ROUTES

- **Adult: IV** 4 mg/kg over 1 hr q4wk, may increase to 8 mg/kg q4wk based on clinical response, max dose 800 mg/inf; do not initiate if ANC >2000, platelets <100,000

Juvenile idiopathic arthritis

- **Child ≥2 yr/adolescent ≥30 kg: IV** 8 mg/kg over 1 hr q2wk
- **Child ≥2 yr/adolescent <30 kg: IV** 12 mg/kg over 1 hr

Available forms: Sol for inj 80 mg/4 ml, 200 mg/10 ml, 400 mg/20 ml

Administer:

Intermittent IV INF route

- Visually inspect for particulate matter, discoloration before administration whenever sol and container permit; colorless to pale yellow liquid
- From 100-ml inf bag or bottle, withdraw vol of 0.9% sodium chloride inj equal to vol of tocilizumab sol required for patient's dose
- Slowly add tocilizumab from each vial into inf bag or bottle; gently invert bag to avoid foaming; fully diluted sols are compatible with polypropylene, polyethylene, polyvinyl chloride inf bags and polypropylene, polyethylene, glass inf bottles
- Fully diluted sol for infusion may be stored refrigerated or at room temp for ≤24 hr and should be protected from light; do not use unused product remaining in vials; no preservatives
- Allow the fully diluted sol to reach room temp before inf
- Give over 60 minutes with inf set; do not administer as IV push or bolus
- Do not infuse concomitantly in same IV line with other drugs

SIDE EFFECTS

CNS: Headache, dizziness
CV: Hypertension
GI: Perforation, abdominal pain, gastritis, mouth ulcerations
HEMA: Neutropenia, thrombocytopenia
INTEG: Rash, inf reactions
RESP: Upper respiratory infections, nasopharyngitis, bronchitis
SYST: Serious infections, anaphylaxis, infusion-related reactions, antitocilizumab antibody formation

INTERACTIONS

Decrease: product level—cycloSPORINE, theophylline warfarin
Decreased: level of CYP3A4 substrates (hormonal contraceptives, omeprazole, atorvastatin, simvastatin)
• Do not give with live virus vaccines
• Avoid use with TNF modifiers, DMARDs, immunosuppressives due to increased risk of infection

PHARMACOKINETICS

Half-life approx 6 days with single dose, approx 11 days with multiple (steady-state) doses

NURSING CONSIDERATIONS

Assess:
• **Rheumatoid arthritis:** ROM, pain, stiffness at baseline q1-2wk
• Blood studies: CBC with differential, LFTs, platelet count, serum lipid profile at baseline and periodically
• **Infection** before treatment and periodically; obtain TB screening before beginning treatment, invasive fungal infections, discontinue if infection occurs during administration, may use antituberculosis therapy before tocilizumab in past history of latent or active TB when adequate course of treatment cannot be confirmed and those with a negative TB with risk factors for infections
Evaluate:
• Therapeutic response: ability to move more easily with less pain
Teach patient/family:
• That this treatment must continue unless safety or effectiveness is an issue
• About reason for use and expected results
• To avoid live vaccines, bring immunizations up to date before treatment
Black Box Warning: To report signs, symptoms of infection, including TB and hepatitis B
• To notify prescriber if pregnancy or suspected pregnancy (C), do not use if breastfeeding

tolcapone (Rx)

(toll'cah'pone)
Tasmar
Func. class.: Antiparkinson agent
Chem. class.: COMT inhibitor

ACTION: Inhibits COMT; used as adjunct to levodopa/carbidopa therapy

USES: Parkinson's disease

CONTRAINDICATIONS: Hypersensitivity, rhabdomyolysis
Black Box Warning: Hepatic disease

Precautions: Pregnancy (C), breastfeeding, cardiac/renal disease, hypertension, asthma, history of rhabdomyolysis

DOSAGE AND ROUTES

• **Adult: PO** 100-200 mg tid with levodopa/carbidopa therapy; max 600 mg/day, discontinue if no benefit after 3 wk
Available forms: Tabs 100, 200 mg
Administer:
• Only to be used if levodopa/carbidopa does not provide satisfactory results
• Give without regard to food

SIDE EFFECTS

CNS: Dystonia, dyskinesia, dreaming, *fatigue, headache, confusion,* psychosis, hallucination, dizziness, sleep disorders

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CV: *Orthostatic hypotension,* chest pain, hypotension
EENT: Cataract, eye inflammation
GI: *Nausea, vomiting, anorexia, abdominal distress,* diarrhea, constipation, fatal hepatic failure, increased LFTs
GU: UTI, urine discoloration, uterine tumor, micturition disorder, hematuria
HEMA: Hemolytic anemia, leukopenia, agranulocytosis
INTEG: Sweating, alopecia
MS: Rhabdomyolysis

PHARMACOKINETICS

Rapidly absorbed, peak 2 hr, protein binding 99%, extensively metabolized, half-life 2-3 hr, excreted in urine (60%)/feces (40%)

INTERACTIONS

Increase: CNS depression—CNS depressants
• May influence pharmacokinetics of α-methyldopa, DOBUTamine, apomorphine, isoproterenol
• Inhibition of normal catecholamine metabolism: MAOIs, MAO-B inhibitor may be used

NURSING CONSIDERATIONS

Assess:

Black Box Warning: **Hepatic disease:** AST, ALT, alk phos, LDH, bilirubin, CBC; monitor ALT, AST q2wk × 1 yr, then q4wk × 6 mo, then q8wk thereafter; if LFTs elevated, product should not be used

• Involuntary movements of parkinsonism: akinesia, tremors, staggering gait, muscle rigidity, drooling
• B/P, respiration during initial treatment; hypo/hypertension should be reported
• Mental status: affect, mood, behavioral changes

Evaluate:
• Therapeutic response: decrease in akathisia, increased mood

Teach patient/family:
• To change positions slowly to prevent orthostatic hypotension
• That urine, sweat may change color
• That food taken within 1 hr before meals or 2 hr after meals decreases action of product by 20%, may be taken without regard to food
• To notify prescriber if pregnancy is planned or suspected, pregnancy (C)
• That CNS changes may occur, hallucinations, involuntary movement
• To avoid hazardous activities until reaction is known, dizziness may occur
• That nausea and diarrhea are common

Black Box Warning: **To report signs of hepatic injury:** clay-colored stools, jaundice, fatigue, appetite loss, lethargy, fatigue, itching, right upper abdominal pain

• To report nausea, vomiting, anorexia; that nausea may occur at beginning of treatment

tolnaftate topical

See Appendix B

tolterodine (Rx)

(toll-tehr'oh-deen)

Detrol, Detrol LA

Func. class.: Overactive bladder product

Chem. class.: Muscarinic receptor antagonist

ACTION: Relaxes smooth muscles in urinary tract by inhibiting acetylcholine at postganglionic sites

USES: Overactive bladder (urinary frequency, urgency), urinary incontinence

CONTRAINDICATIONS: Hypersensitivity, uncontrolled closed-angle glaucoma, urinary retention, gastric retention

Precautions: Pregnancy (C), breastfeeding, children, renal/hepatic disease, controlled closed-angle glaucoma, blad-

der obstruction, QT prolongation, decreased GI motility

DOSAGE AND ROUTES

• **Adult and geriatric: PO** 2 mg bid; may decrease to 1 mg bid; **EXT REL** 4 mg/day, may decrease to 2 mg/day if needed, max 4 mg/day

Hepatic/renal dose

• **Adult: PO** 1 mg bid (50% dose) or **EXT REL** 2 mg/day; CCr ≤30 ml/min, reduce by 50%

Available forms: Tabs 1, 2 mg; ext rel caps 2, 4 mg

Administer:

• Whole; take with liquids; do not crush, chew or break ext rel product; without regard to meals

SIDE EFFECTS

CNS: Anxiety, paresthesia, fatigue, *dizziness, headache;* increasing dementia, memory impairment

CV: Chest pain, hypertension, QT prolongation

EENT: Vision abnormalities, xerophthalmia

GI: *Nausea, vomiting, anorexia,* abdominal pain, constipation, dry mouth, dyspepsia

GU: Dysuria, urinary retention, frequency, UTI

INTEG: Rash, pruritus

RESP: Bronchitis, cough, pharyngitis, upper respiratory tract infection

SYST: Angioedema, Stevens-Johnson syndrome

PHARMACOKINETICS

Rapidly absorbed; highly protein bound; extensively metabolized by CYP2D6; a portion of the population may be poor metabolizers; excreted in urine, feces

INTERACTIONS

• Do not use in those with known hypersensitivity-festerodine

⚠ **Increase:** QT prolongation—class IA/III antidysrhythmics, some phenothiazines, β-agonists, local anesthetics, tricyclics, haloperidol, methadone, chloroquine, clarithromycin, droperidol, erythromycin, pentamidine

Increase: action of tolterodine—antiretroviral protease inhibitors, macrolide antiinfectives, azole antifungals

Increase: anticholinergic effect—antimuscarinics

Increase: urinary frequency—diuretics

Drug/Food

• Food increases bioavailability of tolterodine

NURSING CONSIDERATIONS

Assess:

• **Urinary patterns:** distention, nocturia, frequency, urgency, incontinence

⚠ **Serious skin disorders:** angioedema, Stevens-Johnson syndrome; allergic reactions: rash; if this occurs, product should be discontinued

• LFTs at baseline, periodically

⚠ **QT prolongation:** ECG, ejection fraction; assess for chest pain, palpitations, dyspnea

Evaluate:

• Decreasing dysuria, frequency, nocturia, incontinence

Teach patient/family:

• To avoid hazardous activities; dizziness may occur

• Not to drink liquids before bedtime

• About the importance of bladder maintenance

• Not to breastfeed

• To report signs of infection, skin effects

T

tolvaptan (Rx)

(tole-vap'tan)

Samsca

Func. class.: Antihypertensive

Chem. class.: Vasopressin receptor antagonist, V2

ACTION: Arginine vasopressin (AVP) antagonist with affinity for V2 receptors; level of circulating AVP in circulating

blood is critical for the regulation of water and the electrolyte balance, and it is usually elevated with euvolemic/hypervolemic hyponatremia

USES: Hypervolemic/euvolemic hyponatremia with heart failure, cirrhosis, SIADH

CONTRAINDICATIONS: Hypersensitivity, hypovolemia, anuria
Precautions: Pregnancy (C), breastfeeding, children, dehydration, geriatric, hepatic disease, hyperkalemia

Black Box Warning: Alcoholism, malnutrition

DOSAGE AND ROUTES

• **Adult: PO** 15 mg daily; after 24 hr, may increase to 30 mg daily; max 60 mg/day
Available forms: Tab 15, 30 mg
Administer:
• PO with/without food
• Avoid fluid restriction for first 24 hr
• Initiate in hospital setting

SIDE EFFECTS

CNS: Fever
CV: Ventricular fibrillation, DIC, stroke, thrombosis
GI: Nausea, vomiting, constipation, colitis
GU: Polyuria
HEMA: Bleeding
META: Dehydration, hyperglycemia, hyperkalemia, hypernatremia
MS: Rhabdomyolysis
RESP: Respiratory depression, pulmonary embolism

PHARMACOKINETICS

Peak 2-4 hr, protein binding 99%, metabolized by CYP3A4, terminal half-life 12 hr

INTERACTIONS

Increase: concentrations of tolvaptan—CYP3A4 inhibitors (efavirenz, fosamprenavir, quiNINE); P-gp inhibitors (cycloSPORINE, azithromycin, mefloquine, palperidone, propafenone, quiNIDine, testosterone)
Decrease: conc of tolvaptan—CYP3A4 inducers (carBAMazepine, dexamethasone, etravirine, flutamide, griseofulvin, metyrapsone, modafinil, nafacillin, nevirapine, OXcarbazepine, phenytoin, rifampin, rifabutin, rifapendine, topiramate)
Drug/Herb
Decreased: tolvaptan effect: CYP3A4 inducer (St. John's wort)
Drug/Food
• Grapefruit juice: do not use together

NURSING CONSIDERATIONS

Assess:
• Renal, hepatic function
• Frequent sodium vol status; overly rapid correction of sodium conc (12 mEq/L per 24 hr), may result in osmotic demyelination syndrome, may occur in alcoholism, severe malnutrition, advanced liver disease, syndrome of inappropriate antidiuretic hormone
• CV status: ventricular fibrillation, hypertension; monitor B/P, pulse
• Monitor electrolytes (sodium, potassium)
Evaluate:
• Therapeutic response: correction of serum sodium levels
Teach patient/family:
• To avoid pregnancy, breastfeeding while taking this product
• About administration procedure and expected results
• To report difficulty swallowing, speaking, seizures, dizziness, drowsiness; embolism may be the cause

topiramate (Rx)

(toh-pire'ah-mate)

Topamax, Topamax Sprinkle, Topiragen

Func. class.: Anticonvulsant—miscellaneous

Chem. class.: Monosaccharide derivative

ACTION: May prevent seizure spread as opposed to an elevation of seizure threshold, increases GABA activity

USES: Partial seizures in adults and children 2-16 yr old; tonic-clonic seizures; seizures with Lennox-Gastaut syndrome; migraine prophylaxis

Unlabeled uses: Infantile spasms, bipolar disorder, alcohol dependence, absence seizures, neuropathic pain, cluster headaches, mania

CONTRAINDICATIONS: Hypersensitivity, metabolic acidosis, pregnancy (D)

Precautions: Breastfeeding, children, renal/hepatic disease, acute myopia, secondary closed-angle glaucoma, behavioral disorders, COPD, dialysis, encephalopathy, status asthmaticus, status epilepticus, surgery, paresthesias, maculopathy

DOSAGE AND ROUTES

Adjunctive therapy for seizures

- **Adult/adolescent/child ≥10 yr: PO** 25-50 mg/day initially, titrate by 25-50 mg/wk, up to 200-400 mg/day in 2 divided doses
- **Child 2-9 yr: PO** week 1: 25 mg in PM, then 25 mg bid if tolerated (week 2), then increase by 25-50 mg/day each week as tolerated over 5 to 7-wk titration period, maintenance given in 2 divided doses; <11 kg, minimum 150 mg/day, max 250 mg/day; 12-22 kg, minimum 200 mg/day, max 300 mg/day; 23-31 kg, minimum 200 mg/day, max 350 mg/day; 32-38 kg, minimum 250 mg/day, max 350 mg/day; >38 kg, minimum 250 mg/day, max 400 mg/day

Migraine prophylaxis

- **Adult: PO** 25 mg/day initially, increase by 25 mg/day/wk up to 100 mg/day in 2 divided doses

Renal dose

- **Adult: PO** CCr <70 ml/min, give $^1/_2$ dose

Atonic/atypical absence/myoclonic seizures (unlabeled)

- **Adult/adolescent >16 yr: PO** 50 mg/day, titrate slowly by 50 mg/wk to 100-300 mg tid
- **Child 2-16 yr: PO** 0.5-1 mg/kg, max 25 mg, initially daily × 7 days then increase by 0.5-1 mg/kg/day weekly up to 3-6 mg/kg/day in divided doses

Refractory infantile spasms (unlabeled)

- **Child: PO** 25 mg/day, may increase by 25 mg q2-3days until spasms controlled, max 24 mg/kg/day

Alcoholism (unlabeled)

- **Adult: PO** 25 mg/day, titrated to max 300 mg/day in divided doses

Neuropathic pain (unlabeled)

- **Adult: PO** 12.5-25 mg q day or bid × 4 wk then double dose q4wk to max 100-200 mg/day in divided doses

Bipolar disorder (unlabeled)

- **Adult: PO** 25 mg/day then increase by 25-mg increments to 200 mg/day

Available forms: Tabs 25, 50, 100, 200 mg; sprinkle caps 15, 25 mg

Administer:

- Swallow tabs whole; do not break, crush, or chew tabs; very bitter
- May take without regard to meals
- Sprinkle cap can be given whole or opened and sprinkled on soft food; do not chew, drink water after sprinkle

SIDE EFFECTS

CNS: *Dizziness, fatigue*, cognitive disorders, insomnia, *anxiety*, depression, paresthesia, *memory loss, tremor*, motor retardation, suicidal ideation

EENT: Diplopia, *vision abnormality*

GI: Diarrhea, *anorexia, nausea, dyspepsia,* abdominal pain, constipation, dry mouth, pancreatitis
GU: Breast pain, dysmenorrhea, menstrual disorder
INTEG: Rash
MISC: Weight loss, leukopenia, metabolic acidosis, increased body temperature; unexplained death (epilepsy)
RESP: Upper respiratory tract infection, pharyngitis, sinusitis

PHARMACOKINETICS

Well absorbed, peak 2 hr, terminal half-life 19-25 hr, excreted in urine (55%-97% unchanged), crosses placenta, excreted in breast milk, protein binding (9%-17%), steady state 4 days

INTERACTIONS

Increase: renal stones—carbonic anhydrase inhibitors
Increase: effect of amitriptyline
Increase: CNS depression—alcohol, CNS depressants
Increase: topiramate levels—metformin, hydrochlorothiazide, lamoTRIgine
Decrease: levels of oral contraceptives, estrogen, digoxin, valproic acid, lithium, risperiDONE
Decrease: topiramate levels—phenytoin, carBAMazepine, valproic acid, probenecid

NURSING CONSIDERATIONS

Assess:
- **Seizures:** location, type, duration, aura
- **Bipolar disorder:** mood, behavior
- Renal studies: urinalysis, BUN, urine creatinine q3mo; symptoms of renal colic
- Hepatic studies: ALT, AST, bilirubin if patient receiving long-term treatment
- CBC during long-term therapy (anemia); serum bicarbonate (metabolic acidosis)
- Migraines: pain location, duration; alleviating factors
- ⚠ Mental status: mood, sensorium, affect, behavioral changes, **suicidal thoughts/behaviors;** if mental status changes, notify prescriber
- Body weight, evidence of cognitive disorder

Perform/provide:
- Storage at room temp away from heat, light
- Assistance with ambulation during early part of treatment; dizziness occurs
- Seizure precautions: padded side rails, move objects that may harm patient

Evaluate:
- Therapeutic response: decreased seizure activity

Teach patient/family:
- To carry emergency ID stating patient's name, products taken, condition, prescriber's name and phone number
- To avoid driving, other activities that require alertness
- Not to discontinue medication quickly after long-term use
- To notify prescriber immediately of blurred vision, periorbital pain
- To maintain adequate fluid intake
- About administration procedure and expected results
- To use nonhormonal contraceptive; that effect of oral contraceptives is decreased, pregnancy (D)
- To drink plenty of fluids to prevent kidney stones
- May need to increase amount of food consumed, weight loss may occur

⚠ HIGH ALERT

topotecan (Rx)

(toh-poh-tee'kan)

Hycamtin

Func. class.: Antineoplastic, natural; topoisomerase inhibitor
Chem. class.: Camptothecin analog

ACTION: Antitumor product with topoisomerase-I–inhibitory activity; topoisomerase I relieves torsional strain

in DNA by causing single-strand breaks; also causes double-strand DNA damage

USES: Metastatic ovarian cancer after failure of traditional chemotherapy; relapsed small-cell lung cancer; cervical cancer
Unlabeled uses: Non–small-cell lung cancer (NSCLC), rhabdomyosarcoma

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, hypersensitivity, severe bone marrow depression

Black Box Warning: Neutropenia

Precautions: Children, renal disease, gelatin hypersensitivity

DOSAGE AND ROUTES

Metastatic carcinoma of the ovary after failure of first or subsequent chemotherapy; SCLC-sensitive disease after failure of first-line therapy

- **Adult: IV INF** 1.5 mg/m² over 30 min daily × 5 days starting on day 1 of 21-day course × 4 courses; may be reduced to 0.25 mg/m² for subsequent courses if severe neutropenia occurs; relapsed small-cell lung cancer (SCLC) in those with a prior complete or partial response, ≥45 days from end of first-line treatment. **PO** 2.3 mg/m²/day on days 1-5 of 21-day course

Renal dose

- **Adult: IV** CCr 20-39 ml/min, 0.75 mg/m²/day × 5 days starting on day 1 of 21-day course

Available forms: Lyophilized powder for inj 4 mg; caps 0.25, 1 mg
Administer:
PO route

- Do not break, crush, chew, or open caps; protect from light
- Take without regard to food

Intermittent IV infusion route

- Visually inspect for particulate matter and discoloration prior to use
- Reconstitute each 4 mg-vial with 4 ml sterile water for injection; use immediately, no preservative
- Withdraw the appropriate volume of the reconstituted solution; dilute further, dilute in 0.9% NaCl or D5W prior to administration
- The reconstituted solution is yellow or yellow-green
- Topotecan injection diluted for infusion is stable at room temperature with normal light for 24 hr
- Infuse over 30 min

SIDE EFFECTS

CNS: Arthralgia, *asthenia, headache,* myalgia, *pain,* weakness
GI: *Abdominal pain, constipation,* diarrhea, obstruction, *nausea,* stomatitis, *vomiting;* increased ALT, AST; anorexia
HEMA: Neutropenia, leukopenia, thrombocytopenia, anemia, sepsis
INTEG: *Total alopecia*
RESP: Dyspnea, cough, interstitial lung disease

PHARMACOKINETICS

Rapidly and completely absorbed, excreted in urine and feces as metabolites, half-life 2.8 hr, 7%-35% bound to plasma proteins

INTERACTIONS

- Avoid use with P-glycoprotein, breast cancer resistance protein inhibitors (amiodarone, clarithromycin, diltiazem, erythromycin, indinavir), quiNIDine, testosterone, verapamil, tamoxifen, itraconazole, mefloquine, RU-486, niCARdipine, vaccines, toxoids

Increase: myelosuppression when used with CISplatin
Increase: bleeding risk—NSAIDs, anticoagulants, thrombolytics, platelet inhibitors
Drug/Food

- Avoid use with grapefruit juice

NURSING CONSIDERATIONS

Assess:

- Hepatic studies: AST, ALT, alk phos, which may be elevated; creatinine, BUN

T

Black Box Warning: CBC, differential, platelet count weekly; withhold product if WBC is $<3500/mm^3$ or platelet count is $<100,000/mm^3$; notify prescriber of results; product should be discontinued

- Buccal cavity for dryness, sores or ulcerations, white patches, oral pain, bleeding, dysphagia
- **Interstitial lung disease (ILD):** fever, cough, dyspnea, hypoxia, may be fatal

Perform/provide:

- Storage of caps in refrigerator; IV INF unopened at room temp; protect both from light
- Increased fluid intake to 2-3 L/day to prevent dehydration unless contraindicated
- Rinsing of mouth tid-qid with water, club soda; brushing of teeth bid-tid with soft brush or cotton-tipped applicator for stomatitis; use unwaxed dental floss

Evaluate:

- Therapeutic response: decreased tumor size, spread of malignancy

Teach patient/family:

- That total alopecia may occur; that hair grows back but is different in color and texture
- To avoid foods with citric acid or hot or rough texture if stomatitis is present; to drink adequate fluids
- To report stomatitis and any bleeding, white spots, ulcerations in mouth; to examine mouth daily; to report symptoms

Black Box Warning: To report signs of anemia: fatigue, headache, faintness, SOB, irritability

- To use effective contraception during treatment and for ≤6 mo after, pregnancy (D); to avoid breastfeeding
- To avoid OTC products without approval of prescriber
- To avoid driving or other activities requiring alertness
- To avoid vaccines, toxoids

toremifene (Rx)

(tor-em'ih-feen)

Fareston

Func. class.: Antineoplastic

Chem. class.: Antiestrogen hormone

ACTION: Inhibits cell division by binding to cytoplasmic estrogen receptors; resembles normal cell complex but inhibits DNA synthesis and estrogen response of target tissue

USES: Advanced breast carcinoma not responsive to other therapy in estrogen-receptor–positive patients (usually postmenopausal)

Unlabeled uses: Prostate cancer prophylaxis

CONTRAINDICATIONS: Pregnancy (D), hypersensitivity, history of thromboembolism

Black Box Warning: QT prolongation

Precautions: Breastfeeding, children, leukopenia, thrombocytopenia, cataracts, hypercalcemia, hepatic disease, endometrial hyperplasia

DOSAGE AND ROUTES

- **Adult: PO** 60 mg/day

Available forms: Tabs 60 mg

Administer:

- Antacid before oral agent; give product after evening meal, before bedtime
- Antiemetic 30-60 min before product to prevent vomiting

SIDE EFFECTS

CNS: *Hot flashes, headache, lightheadedness,* depression

CV: CHF, MI, PE, chest pain, angina

EENT: Ocular lesions, retinopathy, corneal opacity, blurred vision (high doses)

GI: *Nausea, vomiting,* altered taste (anorexia)

GU: Vaginal bleeding, pruritus vulvae

HEMA: Thrombocytopenia, leukopenia, thrombosis

INTEG: Rash, alopecia, *sweating*
META: Hypercalcemia
RESP: Pulmonary embolism

PHARMACOKINETICS

Peak 3 hr, excreted primarily in feces, 99.5% protein binding, terminal half-life 5-6 days, metabolized by liver

INTERACTIONS

• May increase effect of warfarin
Increase: QT prolongation—class IA/III antidysrhythmics, some phenothiazines, β agonists, local anesthetics, tricyclics, haloperidol, chloroquine, droperidol, pentamidine; CYP3A4 inhibitors (amiodarone, clarithromycin, erythromycin, telithromycin, troleandomycin), arsenic trioxide, levomethadyl; CYP3A4 substrates (methadone, pimozide, QUEtiapine, quiNIDine, risperiDONE, ziprasidone)
Increase: toxicity—CYP3A4 inhibitors (aprepitant, antiretroviral protease inhibitors, clarithromycin, danazol, delavirdine, diltiazem, erythromycin, fluconazole, FLUoxetine, fluvoxaMINE, imatinib, ketoconazole, mibefradil, nefazodone, telithromycin, voriconazole)
Decrease: toremifene effect—CYP3A4 inducers (barbiturates, bosentan, carBAMazepine, efavirenz, phenytoins, nevirapine, rifabutin, rifampin)

Drug/Herb
• Avoid use with St. John's wort

Drug/Lab Test
Increase: serum calcium

NURSING CONSIDERATIONS

Assess:
• CBC, differential, platelet count weekly; withhold product if WBC is $<3500/mm^3$ or platelet count is $<100,000/mm^3$; notify prescriber; LFTs, serum calcium
• **Bleeding:** hematuria, guaiac, bruising, petechiae, mucosa or orifices q8hr
• Effects of alopecia on body image; discuss feelings about body changes
Severe allergic reactions: rash, pruritus, urticaria, purpuric skin lesions, itching, flushing

Black Box Warning: QT prolongation: ECG, ejection fraction; assess for chest pain, palpitations, dyspnea

Perform/provide:
• Increase fluid intake to 2-3 L/day to prevent dehydration
• Storage in light-resistant container at room temp

Evaluate:
• Therapeutic response: decreased tumor size, spread of malignancy

Teach patient/family:
• That vaginal bleeding, pruritus, hot flashes are reversible after discontinuing treatment
• To report immediately decreased visual acuity, which may be irreversible; about need for routine eye exams; that health care providers should be told about tamoxifen therapy
• To report vaginal bleeding immediately
• **That tumor flare**—increase in size of tumor, increased bone pain—may occur and will subside rapidly; to take analgesics for pain
• That premenopausal women must use mechanical birth control because ovulation may be induced, pregnancy (D)
• That hair may be lost during treatment; that a wig or hairpiece may make patient feel better; that new hair may be different in color, texture

torsemide (Rx)

(tor'suh-mide)

Demadex

Func. class.: Loop diuretic
Chem. class.: Sulfonamide derivative

T

ACTION: Acts on loop of Henle by inhibiting absorption of chloride, sodium, water

USES: Treatment of hypertension and edema with CHF, ascites

CONTRAINDICATIONS: Infants, hypersensitivity to sulfonamides, anuria

Precautions: Pregnancy (B), breast-feeding, diabetes mellitus, dehydration, severe renal disease, electrolyte depletion, hypovolemia, syncope, ventricular dysrhythmias

DOSAGE AND ROUTES

CHF

• **Adult: PO/IV** 10-20 mg/day, may increase as needed, max 200 mg/day

Edema in chronic renal failure

• **Adult: PO/IV** 20 mg/day, may increase to 200 mg/day

Hepatic cirrhosis in combination with aldosterone antagonist/potassium-sparing diuretic

• **Adult: PO/IV** 5-10 mg/day, may increase as needed, max 40 mg/day

Hypertension

• **Adult: PO** 5 mg/day, may increase to 10 mg/day

Available forms: Tabs 5, 10, 20, 100 mg; inj 10 mg/ml

Administer:

PO route

• In AM to avoid interference with sleep if using product as diuretic

• With food or milk if nausea occurs; absorption may be decreased slightly

IV route

• Visually inspect for particulate matter and discoloration before use

• Give either slowly as an IV bolus or as a continuous IV infusion

• Ampules are single-use containers; discard any unused portion after opening

IV bolus

• No dilution is necessary if given as a slow IV injection; give over 2 min

• If administered through an IV line, flush the line with 0.9% sodium chloride for injection before and after administration

Continuous IV infusion

• If administered through an IV line, flush the line with 0.9% sodium chloride for injection before and after use

• Stable for 24 hr at room temperature

SIDE EFFECTS

CNS: *Headache, dizziness,* asthenia, insomnia, nervousness

CV: Orthostatic hypotension, chest pain, ECG changes, circulatory collapse, ventricular tachycardia, edema

EENT: *Loss of hearing,* ear pain, tinnitus, blurred vision

ELECT: *Hypokalemia, hypochloremic alkalosis, hyponatremia,* metabolic alkalosis

ENDO: *Hyperglycemia, hyperuricemia*

GI: *Nausea,* diarrhea, dyspepsia, cramps, constipation

GU: *Polyuria,* renal failure, glycosuria

INTEG: *Rash,* photosensitivity, pruritus

MS: Cramps, stiffness

RESP: Rhinitis, cough increase

PHARMACOKINETICS

PO: Rapidly absorbed; duration 6 hr; breast milk; crosses placenta; half-life 3.5 hr; protein binding 97%-99%, cleared through hepatic metabolism

INTERACTIONS

Increase: toxicity—lithium, nondepolarizing skeletal muscle relaxants, digoxin

Increase: action of antihypertensives, oral anticoagulants, nitrates

Increase: ototoxicity—aminoglycosides, CISplatin, vancomycin

Decrease: antihypertensive effect of torsemide—indomethacin, carBAMazepine, PHENobarbital, phenytoin, rifampin, NSAIDs

Drug/Herb

• Severe photosensitivity: St. John's wort

Drug/Lab Test

Increase: BUN, creatinine, uric acid, blood glucose, cholesterol

Decrease: potassium, magnesium, chloride sodium

NURSING CONSIDERATIONS

Assess:

• Hearing when giving high doses

• Weight, I&O daily to determine fluid loss; effect of product may be decreased if used daily

• B/P lying, standing; postural hypotension may occur
• Electrolytes: potassium, sodium, chlorine; include BUN, blood glucose, CBC, serum creatinine, blood pH, ABGs, uric acid, Ca, Mg
• Glucose in urine of diabetic patients
• **Signs and symptoms of metabolic alkalosis:** drowsiness, restlessness
• **Signs and symptoms of hypokalemia:** postural hypotension, malaise, fatigue, tachycardia, leg cramps, weakness
• Rashes, temp elevation daily
• Confusion, especially in geriatric patients; take safety precautions if needed

Evaluate:
• Therapeutic response: improvement in edema of feet, legs, sacral area daily if medication is being used with CHF

Teach patient/family:
• To rise slowly from lying, sitting position
• To recognize adverse reactions: muscle cramps, weakness, nausea, dizziness, tinnitus
• To take with food or milk for GI symptoms; to limit alcohol use
• To take early during the day to prevent nocturia
• To use sunscreen, protective clothing to prevent sunburn

TREATMENT OF OVERDOSE:
Lavage if taken orally; monitor electrolytes, administer dextrose in saline; monitor hydration, CV, renal status

traMADol (Rx)
(tram'a-dole)
Conzip, Rybix, Ryzolt, Ultram, Ultram ER, Zytram ✱
Func. class.: Analgesic—miscellaneous

Do not confuse:
traMADol/Toradol

ACTION:
Binds to μ-opioid receptors, inhibits reuptake of norepinephrine, serotonin

USES:
Management of moderate to severe pain, chronic pain
Unlabeled uses: Restless leg syndrome (RLS), postoperative shivering, arthralgia/myalgia, bone/dental/neuropathic pain

CONTRAINDICATIONS:
Hypersensitivity, acute intoxication with any CNS depressant, alcohol, asthma, respiratory depression
Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, seizure disorder, renal/hepatic disease, respiratory depression, head trauma, increased intracranial pressure, acute abdominal condition, drug abuse, depression, suicidal ideation

DOSAGE AND ROUTES

Mild to moderate pain
• **Adult: PO** 25 mg daily, titrate by 25 mg ≥3 days to 100 mg/day (25 mg qid), then may increase by 50 mg ≥3 days to 200 mg (50 mg qid), then 50-100 mg q4-6hr, max 400 mg/day, use caution in geriatric patients; orally disintegrating tab 50 mg/day, titrate by 50 mg q3day, separate doses to 200 mg/day (50 mg qid)
• **Geriatric >75 years: PO** <300 mg/day in divided doses

Moderate to severe chronic pain
• **Adult: PO-ER** (Ultram ER) 100 mg daily, titrate upward q5days in 100-mg increments, max 300 mg/day; (Ryzolt) 100 mg, titrate upward q2-3days in 100-mg increments, max 300 mg/day; products are not interchangeable

Renal dose
• **Adult: PO** CCr <30 ml/min, give q12hr, max 200 mg/day; do not use ext rel tab

Hepatic dose
• **Adult (Child-Pugh C): PO** 50 mg q12hr, do not use ext rel tab

Restless leg syndrome (RLS) (unlabeled)
• **Adult: PO** 50-150 mg/day × 15-24 mo

Available forms: Tabs 50 mg; ext rel tab 100, 200, 300 mg; orally disinte-

T

grating tab 50 mg; ext rel caps 100, 200, 300 mg

Administer:

- **Ext rel products** (Ryzolt/Utram ER) are not interchangeable
- Do not break, crush, or chew ext rel product
- With antiemetic for nausea, vomiting
- When pain is beginning to return; determine dosage interval by patient response
- With or without food; ER: always give with food, or always give on empty stomach

SIDE EFFECTS

CNS: Dizziness, CNS stimulation, somnolence, headache, anxiety, confusion, euphoria, seizures, hallucinations, sedation, neuroleptic-malignant-syndrome–like reactions

CV: Vasodilation, orthostatic hypotension, tachycardia, hypertension, abnormal ECG

EENT: Visual disturbances

GI: Nausea, constipation, vomiting, dry mouth, diarrhea, abdominal pain, anorexia, flatulence, *GI bleeding*

GU: Urinary retention/frequency, menopausal symptoms, dysuria, menstrual disorder

INTEG: Pruritus, rash, urticaria, vesicles, flushing

SYST: Anaphylaxis, Stevens-Johnson syndrome, toxic epidermal necrolysis, serotonin syndrome

PHARMACOKINETICS

Rapidly and almost completely absorbed, steady state 2 days, peak 1.5 hr, duration 6 hr, terminal half-life 7.9-8.8 hr, may cross blood-brain barrier, extensively metabolized, 30% excreted in urine as unchanged product, protein binding 20%

INTERACTIONS

- Inhibition of norepinephrine and serotonin reuptake: MAOIs; use together with caution

Increase: CNS depression—alcohol, sedatives, hypnotics, opiates

⚠ **Increase:** serotonin syndrome—SSRIs, SNRIs, serotonin-receptor agonists

Increase: traMADol levels—CYP3A4 inhibitors (aprepitant, antiretroviral protease inhibitors, clarithromycin, danazol, delavirdine, diltiazem, erythromycin, fluconazole, FLUoxetine, fluvoxaMINE, imatinib, ketoconazole, mibefradil, nefazodone, telithromycin, voriconazole)

Decrease: traMADol effects—CYP3A4 inducers (barbiturates, bosentan, carBAMazepine, efavirenz, phenytoins, nevirapine, rifabutin, rifampin)

Decrease: levels of traMADol—carBAMazepine

Drug/Herb

- Avoid use with St. John's wort

Increase: CNS depression—chamomile, hops, kava, skullcap, valerian

Drug/Lab Test

Increase: creatinine, hepatic enzymes

Decrease: Hgb

NURSING CONSIDERATIONS

Assess:

- **Pain:** location, type, character, give before pain becomes extreme
- **Respiratory depression:** withhold if respirations <12/min
- I&O ratio: check for decreasing output; may indicate urinary retention
- Need for product; dependency
- Bowel pattern; for constipation, increase fluids, bulk in diet
- CNS changes: dizziness, drowsiness, hallucinations, euphoria, LOC, pupil reaction
- **Hypersensitivity:** usually after beginning treatment
- Increased side effects in renal/hepatic disease

⚠ **Serotonin syndrome, neuroleptic malignant syndrome:** increased heart rate, shivering, sweating, dilated pupils, tremors, high B/P, hyperthermia, headache, confusion; if these occur, stop product, administer serotonin antagonist if needed

Perform/provide:
- Storage in cool environment, protected from sunlight
- Assistance with ambulation
- Safety measures: side rails, night-light, call bell within easy reach

Evaluate:
- Therapeutic response: decrease in pain

Teach patient/family:
- To report any symptoms of CNS changes, allergic reactions, serotonin syndrome, seizures
- That drowsiness, dizziness, and confusion may occur; to avoid hazardous activities
- To make position changes slowly because orthostatic hypotension may occur
- To avoid OTC medications, herbs, supplements, CNS depressants and alcohol unless approved by prescriber
- Not to discontinue abruptly, taper

trandolapril (Rx)

(tran-doe'la-prill)

Mavik

Func. class.: Antihypertensive

Chem. class.: Angiotension-converting enzyme inhibitor

ACTION: Selectively suppresses renin-angiotensin-aldosterone system; inhibits ACE; prevents conversion of angiotensin I to angiotensin II, dilates arterial and venous vessels, lowers B/P

USES: Hypertension, heart failure, left ventricular dysfunction post MI

CONTRAINDICATIONS: Breastfeeding, hypersensitivity, history of angioedema

Black Box Warning: Pregnancy (D) 2nd/3rd trimester

Precautions: Geriatric patients, hyperkalemia, hepatic disease, bilateral renal stenosis, after kidney transplant, aorta/mitral valve stenosis, cirrhosis, severe renal disease, untreated CHF, autoimmune disease, cough, pregnancy (C) 1st trimester

DOSAGE AND ROUTES

Hypertension
- **Adult: PO** 1 mg/day; 2 mg/day in African-Americans; make dosage adjustment ≥1 wk; max 8 mg/day

Heart failure, left ventricular dysfunction post MI
- **Adult: PO** 1 mg/day, titrate upward to 4 mg/day if tolerated

Renal/hepatic dose
- **Adult: PO** CCr <30 ml/min or hepatic disease, 0.5 mg/day

Available forms: Tabs 1, 2, 4 mg

Administer:
- Discontinue diuretic 2-3 days before starting this product; if not possible, decrease initial dose to 0.5 ml
- Make dosage changes ≥1 wk
- Give without regard to food
- Space antacids by 2 hr after dose

SIDE EFFECTS

CNS: *Dizziness, syncope,* paresthesias, headache, fatigue, drowsiness, depression, sleep disturbances, anxiety

CV: *Hypotension,* MI, palpitations, angina, TIAs, stroke, *bradycardia,* dysrhythmias

GI: Nausea, vomiting, cramps, diarrhea, constipation, pancreatitis, *dyspepsia*

GU: Proteinuria, renal failure

HEMA: Agranulocytosis, neutropenia, leukopenia, anemia

INTEG: Rash, purpura, pruritus

MISC: Hyperkalemia, hyponatremia, impotence, *myalgia,* angioedema, muscle cramps, *asthenia,* hypocalcemia, gout

RESP: Dyspnea, *cough*

PHARMACOKINETICS

Peak 4-10 hr, duration 24 hr, half-life 6-10 hr, metabolized by liver (active metabolite trandolaprilat), excreted in urine, protein binding 65%-94%

INTERACTIONS

Increase: effects—phenothiazines, diuretics
Increase: severe hypotension—diuretics, other antihypertensives, NSAIDs
Increase: potassium levels—salt substitutes, potassium-sparing diuretics, potassium supplements
Increase: effects of ergots, neuromuscular blocking agents, antihypertensives, hypoglycemics, barbiturates, reserpine, levodopa, lithium
Decrease: effects of trandolapril—antacids, NSAIDs, salicylates

Drug/Lab Test

Increase: potassium, LFTs, BUN, creatinine
Decrease: sodium, WBC

NURSING CONSIDERATIONS

Assess:

- **Hepatotoxicity (rare):** increased LFTs, jaundice, fulfillment hepatic necrosis; if jaundice occurs, discontinue product
- **Angioedema** of the face, edema of the extremities, mucus membranes, may need to discontinue
- **Hyperkalemia:** monitor electrolytes, check potassium
- B/P, pulse q4hr; note rate, rhythm, quality
- Baselines of renal, hepatic studies before therapy begins
- Edema in feet, legs daily
- **Symptoms of CHF:** edema, dyspnea, wet crackles

Evaluate:

- Therapeutic response: decreased B/P

Teach patient/family:

- Not to use OTC (cough, cold, or allergy) products unless directed by prescriber, to separate antacids by 2 hr; to avoid salt substitutes
- To comply with dosage schedule even if feeling better
- To notify prescriber of mouth sores, sore throat, fever, swelling of hands/feet, irregular heartbeat, chest pain, signs of angioedema
- That excessive perspiration, dehydration, vomiting, diarrhea may lead to fall in B/P; to consult prescriber if these occur
- That product may cause dizziness, fainting; lightheadedness may occur during 1st few days of therapy
- That product may cause skin rash or impaired perspiration
- Not to discontinue product abruptly, taper
- To rise slowly to sitting or standing position to minimize orthostatic hypotension

Black Box Warning: To notify prescriber if pregnancy is planned or suspected; pregnancy (D)

⚠ HIGH ALERT

trastuzumab (Rx)

(tras-tuz'uh-mab)

Herceptin

Func. class.: Antineoplastic—miscellaneous

Chem. class.: Humanized monoclonal antibody

ACTION: DNA-derived monoclonal antibody selectively binds to extracellular portion of human epidermal growth factor receptor 2; it inhibits the proliferation of cancer cells

USES: Breast cancer; metastatic with overexpression of HER2, early breast cancer (adjuvant, neoadjuvant), gastric cancer; previously untreated HER2 overexpressing metastatic gastric or gastroesophageal junction adenocarcinoma with CISplatin, 5-fluorouracil or capecitabine

CONTRAINDICATIONS: Pregnancy (D); hypersensitivity to this product, Chinese hamster ovary cell protein

Precautions: Breastfeeding, children, geriatric patients, pulmonary disease, anemia, leukopenia

Black Box Warning: Cardiac disease, respiratory distress syndrome, respiratory insufficiency, infusion-related reactions, cardiomyopathy

DOSAGE AND ROUTES

Breast cancer

- Several regimens may be used
- **Adult: IV** 4 mg/kg given over 90 min then maintenance 2 mg/kg given over 30 min; do not give as IV push or bol; may be given in combination with other antineoplastics

Gastric cancer

- **Adult: IV** 8 mg/kg over 90 min on day 1 then 6 mg/kg over 30-90 min q21days from day 22, give with CISplatin 80 mg/m^2 on day 1 plus 5-fluorouracil 800 mg/m^2 **CONT INF** on days 1-5 or capecitabine 1000 mg/m^2 bid on days 1-14, repeat cycle q3wk

Available forms: Lyophilized powder 440 mg

Administer:

- Acetaminophen as ordered to alleviate fever and headache

Intermittent IV INF route

- After reconstituting vial with 20 ml bacteriostatic water for inj, 1.1% benzyl alcohol preserved (supplied) to yield 21 mg/ml, mark date on vial 28 days from reconstitution date; if patient is allergic to benzyl alcohol, reconstitute with sterile water for inj; use immediately, infuse over 90 min; q3wk give 8 mg/kg loading dose over 90 min, subsequent 6 mg/kg dose may be given over 30-60 min
- Do not mix or dilute with other products or dextrose sol

SIDE EFFECTS

CNS: *Dizziness, numbness, paresthesias,* depression, *insomnia,* neuropathy, peripheral neuritis

CV: Tachycardia, CHF

GI: Nausea, vomiting, *anorexia, diarrhea,* abdominal pain, hepatotoxicity, dysgeusia

HEMA: *Anemia,* leukopenia

INTEG: Rash, acne, herpes simplex

META: Edema, peripheral edema

MISC: *Flulike symptoms; fever, headache, chills*

MS: Arthralgia, *bone pain*

RESP: *Cough, dyspnea, pharyngitis, rhinitis,* sinusitis, pneumonia, pulmonary edema/fibrosis, acute respiratory distress syndrome (ARDS)

SYST: Anaphylaxis, angioedema

PHARMACOKINETICS

Half-life 1-32 days

INTERACTIONS

Increase: bleeding risk—warfarin

Increase: cardiomyopathy—anthracyclines, cyclophosphamide; avoid use

Decrease: immune response—vaccines, toxoids

NURSING CONSIDERATIONS

Assess:

- CBC, HER2 overexpression

Black Box Warning: CHF, other cardiac symptoms: dyspnea, coughing; gallop; obtain full cardiac workup including ECG, echo, multigated acquisition scan

- Symptoms of infection; may be masked by product
- CNS reaction: LOC, mental status, dizziness, confusion
- **Hypersensitive reactions, anaphylaxis**

Black Box Warning: **Inf reactions** that may be fatal: fever, chills, nausea, vomiting, pain, headache, dizziness, hypotension; discontinue product

- **Pulmonary toxicity:** dyspnea, interstitial pneumonitis, pulmonary hypertension, ARDs; can occur after infusion reaction, those with lung disease may have more severe toxicity

Perform/provide:

- Increased fluid intake to 2-3 L/day

T

Evaluate:
• Therapeutic response: decrease in size of tumors
Teach patient/family:
• To take acetaminophen for fever
• To avoid hazardous tasks because confusion, dizziness may occur
• To report signs of infection: sore throat, fever, diarrhea, vomiting
• That emotional lability is common; to notify prescriber if severe or incapacitating
• To use contraception while taking this product; pregnancy (D); to avoid breastfeeding

Black Box Warning: To report pain at infusion site

travoprost ophthalmic

See Appendix B

traZODone (Rx)

(tray'zoe-done)
Oleptro
Func. class.: Antidepressant—miscellaneous
Chem. class.: Triazolopyridine

Do not confuse:
traZODone/traMADol

ACTION: Selectively inhibits serotonin uptake by brain; potentiates behavorial changes

USES: Depression
Unlabeled uses: Alcoholism, anxiety, panic disorder, insomnia

CONTRAINDICATIONS: Hypersensitivity to tricyclics, recovery phase of MI, seizure disorders, prostatic hypertrophy
Precautions: Pregnancy (C), suicidal patients, severe depression, increased intraocular pressure, closed-angle glaucoma, urinary retention, cardiac/hepatic disease, hyperthyroidism, electroshock therapy, elective surgery, bleeding, abrupt discontinuation, bipolar disorder, breastfeeding, dehydration, hyponatremic, hypovolemia

Black Box Warning: Suicidal ideation in children/adolescents

DOSAGE AND ROUTES

Depression
• **Adult: PO** 150 mg/day in divided doses, may increase by 50 mg/day q3-4days, max 400 mg/day (outpatient), 600 mg/day (inpatients); **EXT REL** 150 mg in PM, may increase gradually by 75 mg/day q3days, max 375 mg/day
• **Child 6-18 yr (unlabeled): PO** 1.5-2 mg/kg/day in divided doses, may increase q3-4days up to 6 mg/kg/day or 400 mg/day, whichever is less
• **Geriatric: PO** 25-50 mg at bedtime, increase by 25-50 mg q3-7days to desired dose, usually 75-150 mg/day
Alcoholism (unlabeled)
• **Adult: PO** 50-100 mg/day
Panic disorder (unlabeled)
• **Adult: PO** 150 mg in divided doses, may increase by 50 mg/day q3-4days
Insomnia (unlabeled)
• **Adult: PO** 50 mg at bedtime
Available forms: Tabs 50, 100, 150, 300 mg; ext rel tabs 150, 300 mg
Administer:
• Increased fluids, bulk in diet if constipation occurs, especially in geriatric patients
• With food, milk for GI symptoms
• Dosage at bedtime for oversedation during day; may take entire dose at bedtime; geriatric patients may not tolerate daily dosing
• Avoid use of CNS depressants
• Do not crush, break, chew ext rel product

SIDE EFFECTS

CNS: *Dizziness, drowsiness,* confusion, headache, anxiety, tremors, stimulation, weakness, insomnia, nightmares, EPS (geriatric patients), increase in psychiat-

ric symptoms, suicide in children/adolescents
CV: *Orthostatic hypotension, ECG changes, tachycardia,* hypertension, palpitations
EENT: *Blurred vision,* tinnitus, mydriasis
GI: *Diarrhea, dry mouth,* nausea, vomiting, paralytic ileus, increased appetite, cramps, epigastric distress, jaundice, hepatitis, stomatitis, constipation
GU: *Urinary retention,* acute renal failure, priapism
HEMA: Agranulocytosis, thrombocytopenia, eosinophilia, leukopenia
INTEG: Rash, urticaria, sweating, pruritus, photosensitivity

PHARMACOKINETICS

Peak 1 hr without food, 2 hr with food; metabolized by liver (CYP3A4); excreted by kidneys, in feces; half-life 4.4-7.5 hr

INTERACTIONS

⚠ Hyperpyretic crisis, seizures, hypertensive episode: MAOIs; do not use within 14 days of traZODone
Increase: toxicity, serotonin syndrome—FLUoxetine, nefazodone, other SSRIs, SNRIs, linezolid; methylene blue (IV)
Increase: effects of direct-acting sympathomimetics (EPINEPHrine), alcohol, barbiturates, benzodiazepines, CNS depressants, digoxin, phenytoin, carBAMazepine
Increase: effects of traZODone—CYP3A4, 2D6 inhibitors (phenothiazines, protease inhibitors, azole antifungals)
Increase or decrease: effects of warfarin
Decrease: effects of guanethidine, cloNIDine, indirect-acting sympathomimetics (ePHEDrine)

Drug/Herb
Increase: serotonin syndrome—SAM-e, St. John's wort
Increase: CNS depression—hops, kava, lavender, valerian

Drug/Lab Test
Increase: LFTs
Decrease: Hgb

NURSING CONSIDERATIONS

Assess:
- B/P lying, standing; pulse q4hr; if systolic B/P drops 20 mm Hg, hold product, notify prescriber; take vital signs q4hr in patients with CV disease
- Blood studies: CBC, leukocytes, differential, cardiac enzymes if patient is receiving long-term therapy
- Hepatic studies: AST, ALT, bilirubin
- Weight weekly; appetite may increase with product
- ECG for flattening of T wave, bundle branch block, AV block, dysrhythmias in cardiac patients
- EPS, primarily in geriatric patients: rigidity, dystonia, akathisia

Black Box Warning: Mental status changes: mood, sensorium, affect, suicidal tendencies, increase in psychiatric symptoms, depression, panic; observe for suicidal behaviors in children/adolescents, not approved for children

- Urinary retention, constipation; constipation most likely in children
- **Withdrawal symptoms:** headache, nausea, vomiting, muscle pain, weakness; not usual unless product discontinued abruptly
- Alcohol consumption; hold dose until morning

⚠ **Serotonin syndrome, neuroleptic malignant syndrome:** increased heart rate, shivering, sweating, dilated pupils, tremors, high B/P, hyperthermia, headache, confusion; if these occur, stop product, administer serotonin antagonist if needed

Perform/provide:
- Storage in tight, light-resistant container at room temp
- Assistance with ambulation during beginning therapy for drowsiness, dizziness

Evaluate:
- Therapeutic response: decreased depression

Teach patient/family:
- That therapeutic effects may take 2-3 wk; to take product before bedtime, not to crush, chew ext rel product

T

- To use caution when driving, performing other activities requiring alertness because of drowsiness, dizziness, blurred vision
- To avoid alcohol ingestion
- Not to discontinue medication quickly after long-term use; may cause nausea, headache, malaise
- To report urinary retention, priapism >4 hr immediately
- To wear sunscreen or large hat because photosensitivity occurs

Black Box Warning: That suicidal thoughts/behaviors may occur (adolescents/children)

- To notify prescriber if pregnancy is planned or suspected, pregnancy (C), avoid breastfeeding

TREATMENT OF OVERDOSE:

ECG monitoring; lavage, activated charcoal; administer anticonvulsant, atropine for bradycardia

treprostinil (Rx)

(treh-prah'stin-ill)

Remodulin, Tyvaso

Func. class.: Antiplatelet agent

Chem. class.: Tricyclic benzidine prostacyclin analog

ACTION: Direct vasodilation of pulmonary, systemic arterial vascular beds; inhibition of platelet aggregation

USES: Pulmonary arterial hypertension (PAH) NYHA class II through IV

Unlabeled uses: Pulmonary arterial hypertension in children/adolescents, pediatric patients transitioning from epoprostenol to treprostinil, claudication

CONTRAINDICATIONS: Hypersensitivity to this product, other prostacyclin analogs

Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, past renal/hepatic disease, thromboembolic disease, abrupt discontinuation, IV administration

DOSAGE AND ROUTES

Pulmonary arterial hypertension (WHO Group 1)

- **Adult: SUBCUT INF** 1.25 ng/kg/min by **CONT INF,** may reduce to 0.625 ng/kg/min if not tolerated; may increase by 1.25 ng/kg/min q wk for first 4 wk then 2.5 ng/kg/min/wk for remainder of inf; **ORAL INH** 3 breaths via Tyvaso inh system qid

Hepatic dose

- **Adult: SUBCUT INF** 0.625 ng/kg ideal body weight/min; increase cautiously

Available forms: Inj 1, 2.5, 5, 10 mg/ml; neb sol 1.74 mg/2.9 ml

Administer:

- Sudden decreased doses, abrupt withdrawal may worsen pulmonary arterial hypertension symptoms

SUBCUT route

- By continuous inf
- No dilution required

Oral INH route

- Avoid skin, eyes; do not take orally; use Tyvaso Inhalation System only
- Patient should have backup Optineb-ir device to avoid interruptions
- Follow instructions for use, cleaning
- Do not mix with other medications in Optineb-ir device
- Twist off cap, squeeze total contents into medicine cup; vol is sufficient for 4 treatments

Continuous IV INF route

- By surgically placed CV catheter using ambulatory inf pump
- IV pump, product, patient education can be obtained from Priority Healthcare in United States
- Must be diluted with sterile water for inj or 0.9% NaCl
- Conc should be calculated using this formula: diluted conc = [dose (ng/kg/min) × weight (kg) × 0.00006] / inf rate (ml/hr)]

SIDE EFFECTS

CNS: Dizziness, headache, syncope
CV: Vasodilation, hypotension, edema, right ventricular heart failure
GI: Nausea, *diarrhea*
INTEG: *Rash,* pruritus
OTHER: Jaw pain, cough, throat irritation
SYST: Inf site reactions, pain; increased risk for infection

PHARMACOKINETICS

Metabolized by liver; excreted in urine, feces; terminal half-life 2-4 hr; 90% protein binding

INTERACTIONS

• Excessive hypotension: diuretics, antihypertensives, vasodilators, MAOIs, β-blockers, calcium channel blockers
Increase: bleeding tendencies—anticoagulants, aspirin, NSAIDs, thrombin inhibitors, SSRIs

NURSING CONSIDERATIONS

Assess:
• **Hypertension:** monitor B/P, baseline and periodically
• Hepatic studies: AST, ALT, bilirubin, creatinine with long-term therapy
⚠ Blood studies: CBC; CBC q2wk × 3 mo, Hct, Hgb, PT with long-term therapy, ABGs
⚠ Bleeding time at baseline, throughout treatment; levels may be 2-5× normal limit
Evaluate:
• Avoid abrupt discontinuation
• Therapeutic response: decreased pulmonary arterial hypertension (PAH)
Teach patient/family:
• That blood work will be necessary during treatment, that treatment may last for years
• To report side effects such as diarrhea, skin rashes
• That therapy will be needed for prolonged periods of time, sometimes years
• To prevent infection, aseptic technique must be used for preparation, administration of treprostinil
• That there are many product, herbal interactions
• About signs, symptoms of bleeding; blood in urine, stools
• How to use inhaled solution, how to care for equipment

tretinoin (vit A acid, retinoic acid) (Rx)

(tret'i-noyn)
Avita, Renova, Retin-A, Retin-A Micro, Stieva-A ✤
Func. class.: Vit A acid, acne product; antineoplastic (miscellaneous)
Chem. class.: Tretinoin derivative

ACTION: (Topical) Decreases cohesiveness of follicular epithelium, decreases microcomedone formation; (PO) induces maturation of acute promyelocytic leukemia, exact action is unknown

USES: (Topical) Acne vulgaris (grades 1-3); (PO) acute promyelocytic leukemia, facial wrinkles, photoaging
Unlabeled uses: Acne rosacea, actinic keratosis, ichthyosis, Kaposi's sarcoma, keloids, keratosis follicularis, melasma

CONTRAINDICATIONS: Hypersensitivity to retinoids or sensitivity to parabens
Black Box Warning: Pregnancy (D) (PO)
Precautions: Pregnancy (C) (topical), breastfeeding, eczema, sunburn, sun exposure
Black Box Warning: Rapid-evolving leukocytosis, respiratory compromise, acute promyelocytic leukemia differentiation syndrome

DOSAGE AND ROUTES

• **Adult and child: TOP** cleanse area, apply 0.025%-0.1% cream or 0.05% liquid gel at bedtime, cover lightly

T

Promyelocytic leukemia

• **Adult: PO** 45 mg/m²/day given as 2 evenly divided doses until remission, discontinue treatment 30 days after remission or 90 days of treatment, whichever is first

Available forms: Cream 0.01%, 0.02%, 0.025%, 0.05%, 0.1%; gel 0.01%, 0.025%, 0.04%, 0.05%, 0.1%; liquid 0.05%; caps 10 mg

Administer:

Topical route

• Once daily before bedtime; cover area lightly using gauze; use gloves to apply

SIDE EFFECTS

Oral

CNS: *Headache, fever, sweating,* fatigue

CV: Cardiac dysrhythmias, pericardial effusion

GI: *Nausea, vomiting,* hemorrhage, *abdominal pain, diarrhea, constipation, dyspepsia, distention, hepatitis*

Topical

INTEG: Rash, stinging, warmth, redness, erythema, blistering, crusting, peeling, contact dermatitis, hypo/hyperpigmentation, dry skin, pruritus, scaly skin, retinoic acid syndrome (RAS)

META: Hypercholesterolemia, hypertriglyceridemia

RESP: Pneumonia, upper respiratory tract disease

PHARMACOKINETICS

PO: Terminal half-life 0.5-2 hr

TOPICAL: Poor systemic absorption

INTERACTIONS

• Use with caution: medicated, abrasive soaps; cleansers that have a drying effect; products with high conc of alcohol astringents (topical)

Increase: peeling—medication containing agents such as sulfur, benzoyl peroxide, resorcinol, salicylic acid (topical)

Increase: plasma concentrations of tretinoin—ketoconazole (PO)

Increase: ICP, risk of pseudotumor cerebri—tetracyclines; do not use together

Increase: photosensitivity—retinoids, quinolones, phenothiazines, sulfonamides, sulfonylureas, thiazide diuretics

Increase: thrombotic complications—aminocaproic acid, aprotinin, tranexamic acid

Drug/Lab Test

Increase: AST, ALT

NURSING CONSIDERATIONS

Assess:

Topical route

• Area of body involved, what helps or aggravates condition; cysts, dryness, itching; lesions may worsen at beginning of treatment

PO route

• Hepatic function, coagulation, hematologic parameters; also cholesterol, triglycerides

Perform/provide:

Topical route

• Storage at room temp

• Handwashing after application

Evaluate:

• Therapeutic response: decrease in size, number of lesions

Teach patient/family:

Topical route

• To avoid application on normal skin; to avoid getting cream in eyes, nose, other mucous membranes; not to use product on areas with cuts, scrapes

• To use cream/gel by applying a thin layer to affected skin; to rub gently; to use liquid; to apply with fingertip or cotton swab

• To avoid sunlight, sunlamps; to use protective clothing, sunscreen

• That treatment may cause warmth, stinging; that dryness, peeling will occur

• That cosmetics may be used over product; not to use shaving lotions

• That rash may occur during first 1-3 wk of therapy

• That product does not cure condition, only relieves symptoms

• That therapeutic results may be seen in 2-3 wk but may not be optimal until after 6 wk

PO route

Black Box Warning: To notify prescriber if pregnancy is planned or suspected; pregnancy (D) PO

tretinoin topical

See Appendix B

triamcinolone (Rx)

(trye-am-sin'oh-lone)

Aristospan, Kenalog-10, Tac-3, Triesence

Func. class.: Corticosteroid, synthetic

Chem. class.: Glucocorticoid, intermediate acting

See ophthalmic in Appendix B

ACTION: Decreases inflammation by suppression of migration of polymorphonuclear leukocytes, fibroblasts; reversal of increased capillary permeability and lysosomal stabilization

USES: Severe inflammation, immunosuppression, neoplasms, asthma (steroid dependent); collagen, respiratory, dermatologic/rheumatic disorders

CONTRAINDICATIONS: Hypersensitivity, neonatal prematurity; epidural/intrathecal administration (Triamcinolone acetonide injections [Kenalog])

Precautions: Pregnancy (C), breastfeeding, diabetes mellitus, glaucoma, osteoporosis, seizure disorders, ulcerative colitis, CHF, myasthenia gravis, renal disease, esophagitis, peptic ulcer, acne, cataracts, coagulopathy, head trauma, children <2 yr, psychosis, idiopathic thrombocytopenia, acute glomerulonephritis, amebiasis, fungal infections, nonasthmatic bronchial disease, AIDS, TB, adrenal insufficiency, acute bronchospasm

DOSAGE AND ROUTES

• **Adult: IM** (acetonide, diacetate) 40 mg/wk; (diacetate, acetonide) 5-48 mg into neoplasms; (diacetate, acetonide) 2-40 mg into joint or soft tissue; (hexacetonide) 0.5 mg/in^2 of affected intralesional skin; (hexacetonide) 2-20 mg into joint or soft tissue

Severe/incapacitating allergic conditions such as asthma

• **Adult: IM** (Trivaris) 60 mg, titrate, usual range 40-80 mg

• **Child: IM** (Trivaris) 0.11-1.6 mg/kg/day (3.2-48 mg/m^2/day) in 3-4 divided doses

Available forms: Inj 25, 40 mg/ml diacetate; inj 3, 10, 40 mg/ml acetonide; inj 20, 5 mg/ml hexacetonide

Administer:

IM route

• After shaking susp (parenteral)

• Titrated dose; use lowest effective dose

• IM inj deep in large muscle mass; rotate sites; avoid deltoid; use 21G needle

• In 1 dose in AM to prevent adrenal suppression; avoid SUBCUT administration, may damage tissue

SIDE EFFECTS

CNS: *Depression, flushing, sweating,* headache, mood changes

CV: *Hypertension,* circulatory collapse, thrombophlebitis, embolism, tachycardia, edema

EENT: Fungal infections, increased intraocular pressure, blurred vision

GI: *Diarrhea, nausea, abdominal distention,* GI hemorrhage, *increased appetite,* pancreatitis

HEMA: Thrombocytopenia

INTEG: Acne, poor wound healing, ecchymosis, petechiae

MS: Fractures, osteoporosis, weakness

PHARMACOKINETICS

PO/IM: Peak 1-2 hr, half-life 2-5 hr

T

INTERACTIONS

Increase: side effects—alcohol, salicylates, indomethacin, amphotericin B, digoxin, cycloSPORINE, diuretics

Increase: action of triamcinolone—salicylates, estrogens, indomethacin, oral contraceptives, ketoconazole, macrolide antiinfectives

Decrease: action of triamcinolone—cholestyramine, colestipol, barbiturates, rifampin, ePHEDrine, phenytoin, theophylline

Decrease: effects of anticoagulants, anticonvulsants, antidiabetics, ambenonium, neostigmine, isoniazid, toxoids, vaccines, anticholinesterases, salicylates, somatrem

Drug/Herb

- Hypokalemia: aloe, cascara, senna

Drug/Lab Test

Increase: cholesterol, sodium, blood glucose, uric acid, calcium, urine glucose

Decrease: Ca, K, T_4, T_3, thyroid ^{131}I uptake test, urine 17-OHCS, 17-KS, PBI

False negative: skin allergy tests

NURSING CONSIDERATIONS

Assess:

- Potassium, blood glucose, urine glucose while patient receiving long-term therapy; hypokalemia and hyperglycemia
- Weight daily; notify prescriber if weekly gain of >5 lb
- B/P, pulse; notify prescriber if chest pain occurs
- I&O ratio; be alert for decreasing urinary output, increasing edema
- Plasma cortisol levels during long-term therapy (normal level: 138-635 nmol/L SI units when drawn at 8 AM)
- **Infection:** increased temp, WBC even after withdrawal of medication; product masks infection
- Potassium depletion: paresthesias, fatigue, nausea, vomiting, depression, polyuria, dysrhythmias, weakness
- Edema, hypertension, cardiac symptoms
- Mental status: affect, mood, behavioral changes, aggression

Perform/provide:

- Assistance with ambulation for patient with bone-tissue disease to prevent fractures
- Use of spacer device for geriatric patients with inhaler

Evaluate:

- Therapeutic response: ease of respirations, decreased inflammation

Teach patient/family:

- That emergency ID as corticosteroid user should be carried
- To notify prescriber if therapeutic response decreases; that dosage adjustment may be needed
- To avoid OTC products: salicylates, alcohol in cough products, cold preparations unless directed by prescriber
- About cushingoid symptoms
- About the symptoms of adrenal insufficiency: nausea, anorexia, fatigue, dizziness, dyspnea, weakness, joint pain

triamcinolone nasal agent

See Appendix B

triamcinolone ophthalmic

See Appendix B

triamcinolone (topical)

(try-am-sin'oh-lone)

Kenalog, Triacet, Triderm

Func. class.: Corticosteroid, topical

ACTION: Crosses cell membrane to attach to receptors to decrease inflammation, itching; inhibits multiple inflammatory cytokines

USES: Inflammation/itching in corticosteroid-responsive dermatoses on the skin or inflammation in the mouth

CONTRAINDICATIONS: Hypersensitivity, use on face, ear canal, infections
Precautions: Pregnancy (C), breastfeeding, children

DOSAGE AND ROUTES

• Apply to the affected areas bid-qid
Available forms: Aerosol 0.2 mg; paste (dental) 0.1%; lotion, cream, ointment 0.025%; ointment 0.05%; lotion, cream, ointment 0.1%; ointment, cream 0.5%
Administer:
Topical route
• May be used with occlusive dressings
• **Cream/Ointment/Lotion:** apply sparingly in a thin film and rub gently into the cleansed, slightly moist affected area
• **Paste:** apply without rubbing, press into lesion until film develops
• **Spray:** spray a small amount of preparation onto the lesion

SIDE EFFECTS

ENDO: HPA axis suppression, Cushing syndrome
INTEG: Burning, folliculitis, pruritus, dermatitis, maceration, hypopigmentation
META: Hyperglycemia; glycosuria

PHARMACOKINETICS

Onset 8-12 hr

INTERACTIONS

Increase: blood glucose

NURSING CONSIDERATIONS

Assess:
• Skin reactions: burning pruritus, folliculitis, mouth lesions
Evaluate:
• Decreasing itching, inflammation on the skin, decreasing mouth lesions
Teach patient/family:
• How to use each product

triamcinolone (topical-oral) (OTC)

(trye-am-sin'oh-lone)

Kenalog in Orabase, Oralone Dental

Func. class.: Topical anesthetic
Chem. class.: Synthetic fluorinated adrenal corticosteroid

ACTION: Binds with steroid receptors, decreases inflammation

USES: Oral pain

CONTRAINDICATIONS: Infants <1 yr, hypersensitivity, application to large areas; presence of fungal, viral, or bacterial infections of mouth or throat
Precautions: Pregnancy (C), children <6 yr, sepsis, denuded skin

DOSAGE AND ROUTES

• **Adult and child: TOP** Press ¼ inch into affected area until film appears, repeat bid-tid
Available forms: Paste 0.1%
Administer:
• After cleansing oral cavity after meals

SIDE EFFECTS

INTEG: Rash, irritation, sensitization

NURSING CONSIDERATIONS

Assess:
• Allergy: rash, irritation, reddening, swelling
• Infection: if affected area is infected, do not apply
Evaluate:
• Therapeutic response: absence of pain in affected area
Teach patient/family:
• To report rash, irritation, redness, swelling
• How to apply paste

T

triazolam (Rx)

(trye-ay'zoe-lam)

Apo-Triazo ♣, Halcion

Func. class.: Sedative-hypnotic, antianxiety

Chem. class.: Benzodiazepine, short acting

Controlled Substance Schedule IV (USA), Targeted (CDSA IV) (Canada)

Do not confuse:
Halcion/Haldol/halcinonide

ACTION: Produces CNS depression at limbic, thalamic, hypothalamic levels of CNS; may be mediated by neurotransmitter γ-aminobutyric acid (GABA); results are sedation, hypnosis, skeletal muscle relaxation, anticonvulsant activity, anxiolytic action

USES: Insomnia, sedative/hypnotic

CONTRAINDICATIONS: Pregnancy (X), breastfeeding, hypersensitivity to benzodiazepines, intermittent porphyria

Precautions: Children <15 yr, geriatric patients, anemia, renal/hepatic disease, suicidal individuals, drug abuse, psychosis, acute closed-angle glaucoma, seizure disorders, angioedema, respiratory disease, depression, sleep-related behaviors (sleep walking)

DOSAGE AND ROUTES

- **Adult: PO** 0.125-0.5 mg at bedtime, max 0.5 mg/day
- **Geriatric: PO** 0.0625-0.125 mg at bedtime, max 0.25 mg/day

Available forms: Tabs 0.125, 0.25 mg

Administer:

- After trying conservative measures for insomnia
- ½ hr before bedtime for sleeplessness
- On empty stomach for fast onset; may be taken with food if GI symptoms occur
- Avoid use with CNS depressants; serious CNS depression may result

SIDE EFFECTS

CNS: *Headache, lethargy, drowsiness, daytime sedation,* dizziness, confusion, lightheadedness, anxiety, irritability, amnesia, poor coordination, complex sleep-related reactions: sleep driving, sleep eating

CV: Chest pain, pulse changes

GI: Nausea, vomiting, diarrhea, heartburn, abdominal pain, constipation, hepatic injury

SYST: Severe allergic reactions

PHARMACOKINETICS

Onset 30-45 min, duration 6-8 hr, metabolized by liver, excreted by kidneys (inactive metabolites), crosses placenta, excreted in breast milk, half-life 2-3 hr

INTERACTIONS

- Smoking may decrease hypnotic effect

Increase: triazolam levels—CYP3A4 inhibitors, protease inhibitors

⚠ **Increase:** effects of cimetidine, disulfiram, erythromycin, clarithromycin, probenecid, isoniazid, oral contraceptives; do not use concurrently

Increase: action of both products—alcohol, CNS depressants

Decrease: effect of antacids, theophylline, rifampin, smoking

Drug/Herb

Increase: CNS depression—chamomile, hops, kava, lavender, valerian

Drug/Food

- Grapefruit may increase action, avoid concurrent use

Drug/Lab Test

Increase: ALT, AST, serum bilirubin

Decrease: RAI uptake

False increase: urinary 17-OHCS

NURSING CONSIDERATIONS

Assess:

- Blood studies: Hct, Hgb, RBC if blood dyscrasias suspected (rare)

• Hepatic studies: AST, ALT, bilirubin if hepatic damage has occurred
• Mental status: mood, sensorium, affect, memory (long, short term), insomnia, withdrawal symptoms, excessive sedation, impaired coordination
• Blood dyscrasias: fever, sore throat, bruising, rash, jaundice, epistaxis (rare)
• Type of sleep problem: falling asleep, staying asleep

Perform/provide:
• Assistance with ambulation after receiving dose
• Cool storage in tight container

Evaluate:
• Therapeutic response: ability to sleep at night, decreased amount of early morning awakening if taking product for insomnia

Teach patient/family:
• To use reliable contraception; pregnancy category (X)
• That dependence is possible after long-term use
• To avoid driving, other activities requiring alertness until product is stabilized
• To avoid alcohol ingestion
• That effects may take 2 nights for benefits to be noticed; that product is for short-term use only; to use for 7-10 continuous nights
• About alternative measures to improve sleep: reading, exercise several hours before bedtime, warm bath, warm milk, TV, self-hypnosis, deep breathing
• That complex sleep-related behaviors (sleep eating/driving) may occur
• That hangover common in geriatric patients but less common than with barbiturates; that rebound insomnia may occur for 1-2 nights after discontinuing product; to discontinue by decreasing dose by 50% q2 nights until 0.125 mg for 2 nights, then stop

TREATMENT OF OVERDOSE:
Lavage, activated charcoal; monitor electrolytes, VS

trifluridine ophthalmic
See Appendix B

trimethobenzamide (Rx)
(trye-meth-oh-ben'za-mide)

Tigan

Func. class.: Antiemetic, anticholinergic

Chem. class.: Ethanolamine derivative

ACTION:
Acts centrally by blocking chemoreceptor trigger zone, which in turn acts on vomiting center

USES:
Nausea, vomiting

CONTRAINDICATIONS:
Children (parenterally), hypersensitivity to opioids, shock

Precautions: Pregnancy (C), children, geriatric patients, cardiac dysrhythmias, acute febrile illness, encephalitis, gastroenteritis, dehydration, electrolyte imbalances, Reye's syndrome

DOSAGE AND ROUTES

Nausea/vomiting
• **Adult: IM** 200 mg 3-4×/day; **PO** 300 mg 3-4×/day

Postoperative
• **Adult: IM** 200 mg followed by 2nd dose 1 hr later

Renal dose
• **Adult: IM** CCr 15-30 ml/min, give 50% of dose

Available forms: Caps 300 mg; inj 100 mg/ml

Administer:

PO route
• Capsules may be swallowed whole, chewed, allowed to dissolve

IM route
• Inj in large muscle mass; aspirate to avoid IV administration; inj not to be used in children or infants

T

Syringe compatibilities: Butorphanol, glycopyrrolate, HYDROmorphone, midazolam, nalbuphine

SIDE EFFECTS

CNS: *Drowsiness,* headache, dizziness, confusion, disorientation, coma, seizures, depression, *vertigo,* EPS
CV: Hypo/hypertension, palpitation, cardiac dysrhythmias
EENT: Dry mouth, blurred vision, photosensitivity
GI: Nausea, diarrhea, vomiting, difficulty swallowing
INTEG: Rash, urticaria, fever, chills, flushing, hyperpyrexia

PHARMACOKINETICS

Metabolized by liver, excreted by kidneys
PO: Onset 20-40 min, duration 3-4 hr
IM: Onset 15-35 min, duration 2-3 hr

INTERACTIONS

Increase: effect—CNS depressants, alcohol

NURSING CONSIDERATIONS

Assess:
- Nausea, vomiting before, after treatment
- VS, B/P; check patients with cardiac disease more often
- Signs of toxicity of other products or masking of symptoms of disease: brain tumor, intestinal obstruction
- Observe for drowsiness, dizziness

Evaluate:
- Therapeutic response: decreased nausea, vomiting

Teach patient/family:
- To avoid hazardous activities, activities requiring alertness because dizziness may occur; to request assistance with ambulation
- To avoid alcohol, other depressants
- To keep out of children's reach

trimethoprim-sulfamethoxazole (Rx)

(trye-meth'oh-prim-sul-fa-meth-ox'a-zole)

Bacter-Aid DS, Bactrim DS, Novo-Trimel ♣, Nu-Cotrimox ♣, Septra, Septra DS, Sultrex, SMZ/TMP

Func. class.: Antiinfective
Chem. class.: Sulfonamide—miscellaneous

ACTION: Sulfamethoxazole (SMZ) interferes with the bacterial biosynthesis of proteins by competitive antagonism of PABA when adequate levels are maintained; trimethoprim (TMP) blocks the synthesis of tetrahydrofolic acid; the combination blocks 2 consecutive steps in the bacterial synthesis of essential nucleic acids and protein

USES: UTI, otitis media, acute and chronic prostatitis, shigellosis, *Pneumocystis jiroveci* pneumonitis, chronic bronchitis, chancroid, traveler's diarrhea

CONTRAINDICATIONS: Breastfeeding, infants <2 mo; hypersensitivity to trimethoprim or sulfonamides; pregnancy at term, megaloblastic anemia, CCr <15 ml/min, porphyria, hyperkalemia
Precautions: Pregnancy (C), geriatric patients, infants, renal disease, G6PD deficiency, impaired hepatic/renal function, possible folate deficiency, severe allergy, bronchial asthma, UV exposure

DOSAGE AND ROUTES

Based on TMP content
UTI
- **Adult: PO** 160 mg TMP q12hr × 10-14 days
- **Child: PO** 8 mg/kg TMP/day in 2 divided doses q12hr (Treatment): 2 mg/kg/day (prophylaxis)

Otitis media

• **Child: PO** 8 mg/kg TMP/day in 2 divided doses q12hr × 10 days

Chronic bronchitis

• **Adult: PO** 160 mg TMP q12hr × 10-14 days

***Pneumocystis jiroveci* pneumonitis**

• **Adult and child: PO** 15-20 mg/kg TMP daily in 4 divided doses q6hr × 14-21 days; **IV** 15-20 mg/kg/day (based on TMP) in 3-4 divided doses for ≤14 days

• Dosage reduction necessary in moderate to severe renal impairment (CCr <30 ml/min)

Available forms: Tabs 80 mg trimethoprim/400 mg sulfamethoxazole, 160 mg trimethoprim/800 mg sulfamethoxazole; susp 40 mg/200 mg/5 ml; IV 16 mg/80 mg/ml

Administer:

PO route

• Medication after C&S; repeat C&S after full course of medication

• With resuscitative equipment, EPINEPHrine available; severe allergic reactions may occur

• On an empty stomach 1 hr before or 2 hr after meals

• With full glass of water to maintain adequate hydration; increase fluids to 2 L/day to decrease crystallization in kidneys

Intermittent IV INF route

• After diluting 5 ml of product/125 ml D_5W, run over 1-1½ hr

Y-site compatibilities: Acyclovir, aldesleukin, allopurinol, amifostine, amphotericin B cholesteryl, atracurium, aztreonam, cefepime, cyclophosphamide, diltiazem, DOXOrubicin liposome, enalaprilat, esmolol, filgrastim, fludarabine, gallium, granisetron, HYDROmorphone, labetalol, LORazepam, magnesium sulfate, melphalan, meperidine, morphine, pancuronium, perphenazine, piperacillin/tazobactam, remifentanil, sargramostim, tacrolimus, teniposide, thiotepa, vecuronium, zidovudine

SIDE EFFECTS

CNS: Headache, insomnia, hallucinations, depression, vertigo, fatigue, anxiety, seizures, product fever, chills, aseptic meningitis

CV: Allergic myocarditis

EENT: Tinnitus

GI: *Nausea, vomiting, abdominal pain,* stomatitis, hepatitis, glossitis, pancreatitis, diarrhea, enterocolitis, anorexia, pseudomembranous colitis

GU: Renal failure, toxic nephrosis; increased BUN, creatinine; crystalluria

HEMA: Leukopenia, neutropenia, thrombocytopenia, agranulocytosis, hemolytic anemia, hypoprothrombinemia, Henoch-Schönlein purpura, methemoglobinemia, eosinophilia I

INTEG: Rash, dermatitis, urticaria, Stevens-Johnson syndrome, erythema, photosensitivity, pain, inflammation at inj site, toxic epidermal necrolysis, erythema multiforme

RESP: Cough, SOB

SYST: Anaphylaxis, SLE

PHARMACOKINETICS

PO: Rapidly absorbed; peak 1-4 hr; half-life 8-13 hr; excreted in urine (metabolites and unchanged), breast milk; crosses placenta; 68% bound to plasma proteins; TMP achieves high levels in prostatic tissue and fluid

INTERACTIONS

Increase: thrombocytopenia—thiazide diuretics

Increase: potassium levels—potassium-sparing diuretics, potassium supplements

Increase: hypoglycemic response—sulfonylurea agents

Increase: anticoagulant effects—oral anticoagulants

Increase: levels of dofetilide

Increase: crystalluria—methenamine

Increase: bone marrow depressant effects—methotrexate

T

Decrease: hepatic clearance of phenytoin, CYP2C9, CYP3A4 inducers
Decrease: response—cycloSPORINE
Drug/Lab Test
Increase: alk phos, creatinine, bilirubin, AST, ALT

NURSING CONSIDERATIONS

Assess:
- I&O ratio; note color, character, pH of urine if product administered for UTI; output should be 800 ml less than intake; if urine is highly acidic, alkalization may be needed
- Renal studies: BUN, creatinine, urinalysis with long-term therapy
- Type of infection; obtain C&S before starting therapy
- Blood dyscrasias, skin rash, fever, sore throat, bruising, bleeding, fatigue, joint pain
- **Allergic reaction:** rash, dermatitis, urticaria, pruritus, dyspnea, bronchospasm; product should be discontinued at 1st sign of rash; AIDS patients more susceptible

Perform/provide:
- Storage in tight, light-resistant container at room temp

Evaluate:
- Therapeutic response: absence of pain, fever; C&S negative

Teach patient/family:
- To take each oral dose with full glass of water to prevent crystalluria; to drink 8-10 glasses of water/day; to take product on an empty stomach 1 hr before meals, 2 hr after meals
- To complete full course of treatment to prevent superinfection
- To avoid sunlight; to use sunscreen to prevent burns
- To avoid OTC medications (aspirin, vit C) unless directed by prescriber
- To use alternative contraceptive measures; that decreased effectiveness of oral contraceptives may occur
- To notify prescriber if skin rash, sore throat, fever, mouth sores, unusual bruising, bleeding occur; to notify prescriber of CNS effects: anxiety, depression, hallucinations, seizures

tropicamide ophthalmic

See Appendix B

trospium (Rx)

(trose'pee-um)
Sanctura, Sanctura XR
Func. class.: Anticholinergic, urinary antispasmodic
Chem. class.: Muscarinic receptor antagonist

ACTION: Relaxes smooth muscles in bladder by inhibiting acetylcholine effect on muscarinic receptors

USES: Overactive bladder (urinary frequency, urgency)

CONTRAINDICATIONS: Hypersensitivity, uncontrolled closed-angle glaucoma, urinary retention, gastric retention, myasthenia gravis
Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, renal/hepatic disease, controlled closed-angle glaucoma, ulcerative colitis, intestinal atony, bladder outflow obstruction

DOSAGE AND ROUTES

- **Adult <75 yr: PO** 20 mg bid 1 hr before meals or on empty stomach; **ER** 60 mg in AM
- **Geriatric ≥75 yr: PO** titrate down to 20 mg/day based on response and tolerance

Renal dose
- **Adult: PO** CCr <30 ml/min, 20 mg/day at bedtime, ext rel product not recommended

Available forms: Tabs 20 mg; caps ext rel 60 mg

Administer:
• 1 hr before meals or on empty stomach (reg rel); in AM (ext rel) ≥1 hr before meal

SIDE EFFECTS

CNS: Fatigue, dizziness, headache
CV: Tachycardia
EENT: Dry eyes, vision abnormalities
GI: Flatulence, abdominal pain, *constipation, dry mouth,* dyspepsia
GU: Urinary retention, UTI
INTEG: Dry skin, angioedema
MISC: Heat stroke, fever

PHARMACOKINETICS

Rapidly absorbed (10%); peak 5-6 hr; protein bound (50%-85%); extensively metabolized; excreted in urine, feces; excreted in urine by active tubular secretion; half-life 20 hr

INTERACTIONS

Increase: drowsiness—CNS depressants, alcohol
Increase or decrease: trospium effect—products excreted by active renal secretion (aMILoride, digoxin, morphine), metformin, quiNIDine, procainamide, ranitidine, tenofovir, triamterene, vancomycin
Drug/Food
Decrease: absorption—high-fat meal

NURSING CONSIDERATIONS

Assess:
• **Urinary patterns:** distention, nocturia, frequency, urgency, incontinence, voiding patterns
Evaluate:
• Therapeutic response: correction of urinary status: absence of dysuria, frequency, nocturia, incontinence
Teach patient/family:
• To avoid hazardous activities because dizziness may occur
• That alcohol may increase drowsiness
• About anticholinergic effects that may occur
• That overheating may occur with strenuous exercise
• To avoid all other products unless approved by prescriber

undecylenic acid topical

See Appendix B

unoprostone ophthalmic

See Appendix B

ustekinumab (Rx)

(us'te-kin'ue-mab)
Stelara
Func. class.: Antipsoriatic agent

ACTION: Interleukin (IL)-12, IL-23 Antagonist

USES: Plaque psoriasis

CONTRAINDICATIONS: Hypersensitivity, sepsis, active infections
Precautions: Pregnancy (B), breastfeeding, children ≤18 yr, geriatric patients, surgery, TB, diabetes mellitus, immunosuppression

DOSAGE AND ROUTES

• **Adult ≥100 kg: SUBCUT** 90 mg, repeat in 4 wk, then 90 mg q12wk starting wk 16
• **Adult ≤100 kg: SUBCUT** 45 mg, repeat in 4 wk, then 45 mg q12wk starting wk 16
Available forms: Solutions for inj 45 mg/0.5 mc
Administer:
• Visually inspect for particulate matter or discoloration; solution should be slightly yellow and may contain a few small translucent or white particles; do not use if discolored, cloudy or if foreign

particulate matter is present; do not shake
- Use at 27 G, 0.5 inch needle
- May be administered subcut into upper arm, abdomen, or thigh; rotate inj sites

SIDE EFFECTS

CNS: Headache, leukoencephalopathy
HEMA: Bleeding
INTEG: *Inj site reaction,* pruritus, skin irritation, erythema
SYST: Serious infections, malignancies

PHARMACOKINETICS

Maximum serum concentration: 13.5 days after a single 45 mg subcut dose, 7 days after a single 90 mg subcut dose; half-life 14.9-45.6 days

INTERACTIONS

- Do not give concurrently with vaccines; immunizations should be brought up to date before treatment
- Avoid use with immunosuppressives

NURSING CONSIDERATIONS

Assess:
- For inj site pain, swelling

Evaluate:
- Therapeutic response: decreased plaque psoriasis

Teach patient/family:
- That product must be continued for prescribed time to be effective
- Not to receive live vaccinations during treatment
- To notify prescriber of possible infection (upper respiratory or other)

valACYclovir (Rx)

(val-a-sye'kloh-vir)

Valtrex

Func. class.: Antiviral

Chem. class.: Synthetic purine nucleoside analog

Do not confuse:
valACYclovir/valGANciclovir
Valtrex/Valcyte

ACTION: Interferes with DNA synthesis by conversion to acyclovir, thereby causing decreased viral replication, time of lesional healing

USES: Treatment or suppression of herpes zoster (shingles), genital herpes, herpes labialis (cold sores), varicella, varicella-zoster
Unlabeled uses: CMV with advanced HIV, posttransplant patients, Bell's palsy, herpes simplex virus prophylaxis, acute retinal necrosis (ARN), encephalitis

CONTRAINDICATIONS: Hypersensitivity to this product or acyclovir, valGANciclovir
Precautions: Pregnancy (B), breastfeeding, geriatric patients, hepatic/renal disease, electrolyte imbalance, dehydration, penciclovir, famciclovir, ganciclovir, hypersensitivity, varicella

DOSAGE AND ROUTES

Herpes zoster (shingles)
- **Adult: PO** 1 g tid × 1 wk

Genital herpes (suppressive, initial)
- **Adult: PO** 1 g bid × 10 days initially

Genital herpes (recurrent episodes)
- **Adult: PO** 500 mg bid × 3 days

Genital herpes (suppressive therapy)
- **Adult: PO** 1 g/day with normal immune function; 500 mg/day for those with ≤9 recurrences/yr; 500 mg bid for HIV-infected patients with CD4 count ≥100

Reduction of transmission
- **Adult: PO** 500 mg/day for source partner

Herpes labialis
- **Adult: PO** 2 g bid × 1 day at 1st sign of lesions

Varicella (chickenpox) in immunocompetent patients
- **Adolescent and child ≥2 yr: PO** 20 mg/kg/dose tid × 5 days, max 3 g/day; start at 1st sign, preferably within 24 hr of rash

Renal dose
- **Adult: PO** CCr 30-49 ml/min, 1 g q12hr (for regimens 1 g q8hr); 1 g q12hr × 1 day (herpes labialis); CCr 10-29 ml/min, 1 g q24hr (genital herpes/herpes zoster); 500 mg q24hr (recurrent genital herpes); CCr <10 ml/min, 500 mg q24hr (genital herpes/herpes zoster), 500 mg q24hr (recurrent genital herpes)

Available forms: Tabs 500 mg, 1 g

Administer:
- As soon as possible (herpes labialis, genital herpes); within 24 hr of rash (varicella)
- Within 72 hr of outbreak (herpes zoster)
- Without regard to food
- Caps may be made into susp by pharmacy

SIDE EFFECTS

CNS: Tremors, lethargy, *dizziness, headache,* weakness, depression
ENDO: *Dysmenorrhea*
GI: *Nausea,* vomiting, diarrhea, abdominal pain, constipation, *increased AST*
HEMA: Thrombocytopenic purpura, hemolytic uremic syndrome
INTEG: *Rash*

PHARMACOKINETICS

Onset unknown; terminal half-life 2½-3½ hr; converted to acyclovir that crosses placenta, enters breast milk; excreted in urine primarily as acyclovir; protein binding 13.5%-17.9%

INTERACTIONS

Increase: blood levels of valACYclovir—cimetidine, probenecid; only significant with renal disease

Drug/Lab Test
Increase: LFTs, creatinine
Decrease: WBC, platelets

NURSING CONSIDERATIONS

Assess:
- **Infection;** characteristics of lesions; therapy should be started at 1st sign or symptom of herpes; most effective within 72 hr of outbreak

⚠ Thrombocytopenic purpura, hemolytic uremic syndrome; may be fatal

- C&S before product therapy; product may be taken as soon as culture is taken; repeat C&S after treatment; determine presence of other sexually transmitted diseases
- Bowel pattern before, during treatment
- Skin eruptions: rash
- Allergies before treatment, reaction of each medication

Perform/provide:
- Storage at room temp; protect from light, moisture

Evaluate:
- Therapeutic response: absence of itching, painful lesions; crusting and healed lesions

Teach patient/family:
- To take as prescribed; if dose is missed, to take as soon as remembered up to 2 hr before next dose; not to double dose
- That product may be taken orally before infection occurs; that product should be taken when itching or pain occurs, usually before eruptions
- That partners need to be told that patient has herpes because they can become infected; that condoms must be worn to prevent reinfections
- That product does not cure infection, just controls symptoms; that product does not prevent infection of others

V

valGANciclovir (Rx)

(val-gan-sy'kloh-veer)

Valcyte

Func. class.: Antiviral

Chem. class.: Synthetic nucleoside

Do not confuse:
valGANciclovir/valACYclovir
Valcyte/Valtrex

ACTION: Metabolized to ganciclovir; inhibits replication of human cytomegalovirus in vivo and in vitro by selective inhibition of viral DNA synthesis

USES: Cytomegalovirus (CMV) retinitis in immunocompromised persons, including those with AIDS, after indirect ophthalmoscopy confirms diagnosis; prevention of CMV with transplantation; prevention of CMV in at-risk patient going through transplant (kidney, heart, pancreas)
Unlabeled uses: Colitis, Epstein-Barr virus, esophagitis, herpes simplex type 1, 2; human herpesvirus 6, 8; multicentric Castleman's disease, varicella-zoster virus

CONTRAINDICATIONS: Breastfeeding, hypersensitivity to ganciclovir, valACYclovir; absolute neutrophil count $<500/mm^3$; platelet count $<25,000/mm^3$; hemodialysis; liver transplantation
Precautions: Pregnancy (C), children, geriatric patients, renal function impairment; hypersensitivity to acyclovir, penciclovir, famciclovir

Black Box Warning: Preexisting cytopenias, secondary malignancy, infertility, anemia

DOSAGE AND ROUTES

Treatment of CMV

- **Adult and adolescent (unlabeled): PO** induction 900 mg bid × 21 days with food; maintenance 900 mg/day with food

Transplant (CMV prophylaxis)

- **Adult/adolescent >16 yr: PO** 900 mg/day with food starting 10 days prior to transplantation until day 100 after transplantation
- **Infant ≥4 mo/child/adolescent ≤16 yr: PO** give within 10 days of heart/kidney transplant; calculate dose as 7 × BSA × CCr, give as single daily dose

Renal dose

- **Adult: PO** CCr ≥60 ml/min, same as above; CCr 40-59 ml/min, 450 mg bid for 21 days then 450 mg/day; CCr 25-39 ml/min, 450 mg/day then 450 mg q2days; CCr 10-24 ml/min, 450 mg q2days then 450 mg 2×/week

Available form: Tabs 450 mg, powder for oral sol 50 mg/ml

Administer:

PO tab

- With food for better absorption; avoid getting product on skin; do not break

Oral sol

- Measure 9 ml purified water in graduated cylinder, shake bottle to loosen powder, add ½ liquid, shake well, add remaining water, shake; remove child-resistant cap and push bottle adapter into neck of bottle, close with cap, give using dispenser provided
- Store liquid in refrigerator; do not freeze; throw away any unused after 49 days

SIDE EFFECTS

CNS: *Fever,* chills, coma, *confusion,* abnormal thoughts, dizziness, bizarre dreams, *headache, insomnia,* psychosis, tremors, somnolence, *paresthesia, weakness,* seizures
EENT: Retinal detachment with CMV retinitis
GI: Abnormal LFTs, *nausea, vomiting, anorexia, diarrhea, abdominal pain,* hemorrhage
GU: Hematuria, increased creatinine, BUN
HEMA: Granulocytopenia, thrombocytopenia, irreversible neutropenia, anemia, eosinophilia

INTEG: *Rash,* alopecia, *pruritus,* urticaria, pain at site, phlebitis, Stevens-Johnson syndrome
MISC: Local and systemic infections, sepsis

PHARMACOKINETICS

Metabolized to ganciclovir, which has a half-life of 3-4½ hr; excreted by kidneys (unchanged); crosses blood-brain barrier, CSF

INTERACTIONS

Increase: Severe granulocytopenia: immunosuppressants, zidovudine, antineoplastics, radiation; do not use together
Increase: toxicity—dapsone, pentamidine, flucytosine, vinCRIStine, vinBLAStine, adriamycin, DOXOrubicin, amphotericin B, trimethoprim-sulfamethoxazole combinations or other nucleoside analogs, cycloSPORINE
Increase: effect of both drugs—mycophenolate
Increase: seizures—imipenem-cilastatin
Increase: effect of didanosine; monitor for adverse effects, toxicity
Decrease: renal clearance of valGANciclovir—probenecid
Drug/Food
Increase: absorption, high-fat meal
Drug/Lab Test
Increase: creatinine
Decrease: RBC/WBC, Hct/Hgb

NURSING CONSIDERATIONS

Assess:
• CMV retinitis by ophthalmoscopy before beginning treatment, q2wk; culture for CMV retinitis

Black Box Warning: Leukopenia/neutropenia/thrombocytopenia: WBCs, platelets q2days during 2×/day dosing then q1wk; leukopenia with daily WBC count in patients with prior leukopenia with other nucleoside analogs or for whom leukopenia counts are <1000 cells/mm³ at start of treatment

• Serum creatinine or CCr ≥q2wk

Evaluate:
• Therapeutic response: decreased symptoms of CMV
Teach patient/family:
• That product does not cure condition; that regular ophthalmologic and blood tests necessary
• That major toxicities may necessitate discontinuing product
• To use contraception during treatment; that infertility may occur; that men should use barrier contraception for 90 days after treatment
• To take with food
⚠ Blood dyscrasias: bruising, bleeding, petechiae; seizures, dizziness; to avoid hazardous activities
• To use sunscreen to prevent burns

valproate (Rx)
(val'proh-ate)
Depacon
valproic acid (Rx)
(val'proh-ik)
Depakene, Stavzor
divalproex sodium (Rx)
(dye-val'proh-ex)
Depakote, Depakote ER, Epival ✤
Func. class.: Anticonvulsant, vascular headache suppressant
Chem. class.: Carboxylic acid derivative

ACTION: Increases levels of γ-aminobutyric acid (GABA) in the brain, which decreases seizure activity

USES: Simple (petit mal), complex (petit mal), absence, mixed, seizures; manic episodes associated with bipolar disorder, prophylaxis of migraine, adjunct for schizophrenia, tardive dyskinesia, aggression in children with ADHD, organic brain syndrome, mania, migraines; tonic-clonic (grand mal), myoclonic seizures

V

Unlabeled uses: Rectal for seizures (valproic acid)

CONTRAINDICATIONS

Hypersensitivity, urea cycle disorders

Black Box Warning: Pregnancy (D), hepatic disease, pancreatitis

Precautions: Breastfeeding, geriatric patients

Black Box Warning: Children <2 yr

DOSAGE AND ROUTES

Epilepsy

- **Adult and child: PO** 10-15 mg/kg/day in 2-3 divided doses, may increase by 5-10 mg/kg/day weekly, max 60 mg/kg/day in 2-3 divided doses; **IV** ≤20 mg/min over 1 hr

Status epilepticus refractory to diazepam IV (unlabeled)

- **Adult: RECT** 400-600 mg PR as enema or wax-based suppository (not commercially available)
- **Child: RECT** 20 mg/kg/dose

Mania (divalproex sodium)

- **Adult: PO** 750 mg/day in divided doses, max 60 mg/kg/day or 3000 mg/day

Mania (valproic acid: Stavzor)

- **Adult: DEL REL CAP** 750 mg/day in divided doses

Migraine (divalproex sodium)

- **Adult: PO** 250 mg bid, may increase to 1000 mg/day if needed or 500 mg (Depakote ER) daily × 7 days, then 1000 mg/day

Available forms: *Valproate:* inj 100 mg/ml; *valproic acid:* caps 250 mg; oral solution 250 mg/5 ml; del rel cap (Stavzor) 125, 250, 500 mg; *divalproex:* gastro-resistant tabs 125, 250, 500 mg; ext rel tabs 250, 500 mg cap gastro-resistant; sprinkle cap 125 mg

Administer:

PO route

- Swallow tabs or caps whole; do not break, crush, or chew ext rel tabs
- Sprinkle cap contents on food
- Oral solution alone; do not dilute with carbonated beverage; do not give oral solution to patients with sodium restrictions
- Give with food or milk to decrease GI symptoms

SIDE EFFECTS

CNS: *Sedation, drowsiness,* dizziness, headache, incoordination, depression, hallucinations, behavioral changes, tremors, aggression, weakness, coma, suicidal ideation, hypothermia

EENT: Visual disturbances, taste perversion

GI: *Nausea, vomiting, constipation, diarrhea, dyspepsia,* anorexia, cramps, hepatic failure, pancreatitis, toxic hepatitis, stomatitis, weight gain

GU: Enuresis, irregular menses

HEMA: Thrombocytopenia, leukopenia, lymphocytosis, increased PT, bruising, epistaxis

INTEG: *Rash,* alopecia, photosensitivity, dry skin

META: Hyperammonemia

PHARMACOKINETICS

Metabolized by liver; excreted by kidneys, in breast milk; crosses placenta; half-life 6-16 hr; 90% protein binding

PO: Peak 4 hr (regular rel); 4-17 hr (ext rel)

INTERACTIONS

Increase: valproic acid toxicity level—erythromycin, felbamate, salicylates, NSAIDs, rifampin

Increase: CNS depression—alcohol, opioids, barbiturates, antihistamines, MAOIs, sedative/hypnotics, tricyclics

Increase: action of, possible toxicity phenytoin, carBAMazepine, ethosuximide, barbiturates, zidovudine, LORazepam, rufinamide, lamoTRIgine

Increase: bleeding—warfarin

Decrease: seizure threshold—tricyclics

Drug/Lab Test

False positive: ketones, urine

Interference: thyroid function tests

Increase: LFTs, bleeding time, ammonia

NURSING CONSIDERATIONS

Assess:

- **Seizure disorder:** location, aura, activity, duration; seizure precautions should be in place

⚠ Mental status: bipolar disorder: mood, activity, sleeping/eating, behavior; suicidal thoughts/behaviors

- **Migraines:** frequency, intensity, alleviating factors
- Blood studies: Hct, Hgb, RBC, serum folate, PT/PTT, serum ammonia, platelets, vit D if patient receiving long-term therapy

Black Box Warning: Hepatic studies: AST, ALT, bilirubin; hepatic failure has occurred

- **Hyperammonemic encephalopathy:** can be fatal in those with urea cycle disorders (UCD); lethargy, confusion, coma, CV, respiratory changes; discontinue
- Blood levels: therapeutic level 50-100 mcg/ml, during seizures

Black Box Warning: **Pancreatitis;** may be fatal, report immediately nausea, vomiting, anorexia, abdominal pain

Evaluate:

- Therapeutic response: decreased seizures

Teach patient/family:

- That physical dependency may result from extended use
- To avoid driving, other activities that require alertness
- To drink plenty of fluids
- Not to discontinue medication quickly after long-term use because seizures may result
- To report visual disturbances, rash, diarrhea, abdominal pain, light-colored stools, jaundice, protracted vomiting, weakness to prescriber
- To use contraception while taking this product; pregnancy category (D)
- Overdose symptoms: heart block, coma

valsartan (Rx)

(val'sahr-tan)

Diovan

Func. class.: Antihypertensive

Chem. class.: Angiotensin II receptor antagonist (Type AT_1)

Do not confuse:

Diovan/Dioval

ACTION: Blocks the vasoconstrictor and aldosterone-secreting effects of angiotensin II; selectively blocks the binding of angiotensin II to the AT_1 receptor found in tissues

USES: Hypertension, alone or in combination in patients >6 yr, CHF, post MI with left ventricular dysfunction/failure in stable patients

CONTRAINDICATIONS: Hypersensitivity, severe hepatic disease, bilateral renal artery stenosis

Black Box Warning: Pregnancy (D) 2nd/3rd trimester

Precautions: Breastfeeding, children, geriatric patients, hypersensitivity to ACE inhibitors; CHF, hypertrophic cardiomyopathy aortic/mitral valve stenosis, CAD, angioedema, renal/hepatic disease, hyperkalemia, hypovolemia

DOSAGE AND ROUTES

Hypertension

- **Adult: PO** 80 or 160 mg/day alone or in combination with other antihypertensives, may increase to 320 mg/day
- **Geriatric: PO** adjust on clinical response, may start with lower dose
- **Child and adolescent 6-16 yr: PO** 1.3 mg/kg/day, max 40 mg/day

CHF

- **Adult: PO** 40 mg bid, up to 160 mg bid

Post MI

- **Adult: PO** 20 mg bid as early as 12 hr post MI, may be titrated within 7 days to

40 mg bid, then titrate to maintenance of 160 mg bid
Available forms: Tabs 40, 80, 160, 320 mg
Administer:
• Without regard to meals

SIDE EFFECTS

CNS: *Dizziness, insomnia,* drowsiness, vertigo, headache, fatigue
CV: Angina pectoris, 2nd-degree AV block, cerebrovascular accident, hypotension, MI, *dysrhythmias*
EENT: Conjunctivitis
GI: *Diarrhea,* abdominal pain, nausea, hepatotoxicity
GU: Impotence, nephrotoxicity
HEMA: *Anemia,* neutropenia
META: Hyperkalemia
MISC: Vasculitis, angioedema
MS: Cramps, myalgia, pain, stiffness
RESP: *Cough*

PHARMACOKINETICS

Onset up to 2 hr; peak 4-6 hr; duration 24 hr; extensively metabolized; protein binding 95%; half-life 6 hr; excreted in feces, urine, breast milk

INTERACTIONS

• Do not use with aliskiren
Increase: effects of lithium, antidiabetics
Increase: hyperkalemia—potassium-sparing diuretics, potassium supplements, ACE inhibitors, cycloSPORINE
Increase: Valsartan level—rifampin, ritonavir, gemfibrozil, telithromycin
Decrease: antihypertensive effects—NSAIDs, salicylates
Drug/Herb
Increase: antihypertensive effect—hawthorn
Decrease: antihypertensive effect—ephedra, ma huang
Drug/Food
Increase: hyperkalemia—salt substitutes with potasssium
Decrease: AUC by 40%

NURSING CONSIDERATIONS

Assess:
• B/P, pulse q4hr lying, sitting, standing; note rate, rhythm, quality periodically
• Blood studies; BUN, creatinine, LFTs, potassium total/direct bilirubin before treatment
• **Angioedema:** facial swelling; SOB; edema in feet, legs daily
• Skin turgor, dryness of mucous membranes for hydration status; correct volume depletion before initiating therapy
Evaluate:
• Therapeutic response: decreased B/P
Teach patient/family:
• To comply with dosage schedule, even if feeling better; that, if dose is missed, to take it as soon as possible unless it is within 1 hr of next dose
• To notify prescriber of fever, swelling of hands or feet, irregular heartbeat, chest pain, dizziness, persistent cough
• That excessive perspiration, dehydration, diarrhea may lead to fall in blood pressure; to consult prescriber if these occur
• That product may cause dizziness, fainting, lightheadedness; to rise slowly to sitting or standing position to minimize orthostatic hypotension; to take B/P readings

Black Box Warning: Not to take product if pregnant (D) or breastfeeding

• **Overdose symptoms:** bradycardia or tachycardia, circulatory collapse

vancomycin (Rx)

(van-koe-mye'sin)
Vancocin
Func. class.: Antiinfective—miscellaneous
Chem. class.: Tricyclic glycopeptide

ACTION: Inhibits bacterial cell wall synthesis, blocks glycopeptides

USES: Resistant staphylococcal infections, pseudomembranous colitis, staph-

ylococcal enterocolitis, endocarditis prophylaxis for dental procedures, diphtheroid endocarditis

CONTRAINDICATIONS:

Hypersensitivity to this product or corn

Precautions: Pregnancy (B) PO, (C) IV; breastfeeding, neonates, geriatric patients, renal disease, hearing loss

DOSAGE AND ROUTES

Serious staphylococcal infections

- **Adult: IV** 500 mg q6-8hr or 1 g q12hr
- **Child: IV** 40-60 mg/kg/day divided q6-8hr
- **Neonate: IV** 15 mg/kg initially, then 10 mg/kg q8-24hr

Pseudomembranous/ staphylococcal enterocolitis

- **Adult: PO** 125 mg qid × 10-14 days
- **Child: PO (unlabeled)** 40 mg/kg/day divided q6hr × 7-10 days, max 2 g/day

Endocarditis prophylaxis

- **Adult: IV** 1 g over 1 hr given 1 hr before procedure
- **Child: IV** 20 mg/kg over 1 hr given 1 hr prior to procedure

Renal dose

- **Adult: IV** CCr >70 ml/min, no dosage adjustment; CCr 50-70 ml/min, loading dose of 15 mg/kg, reduce dose to 750 mg-1 g q18-24 hr; CCr <49 ml/min, initial loading dose of 15 mg/kg, with subsequent dosing based on concentration, may be q24-72hr or longer

Available forms: Cap 125, 250 mg; powder for inj 500 mg, 1, 5, 10 g

Administer:

- Use only for susceptible organisms to prevent product-resistant bacteria
- Antihistamine if red-man syndrome occurs: decreased B/P, flushing of neck, face
- Dose based on serum concentration

IT route

- Use preservative-free 0.9% NaCl (2-5 mg/ml final conc), instill into ventricular cerebrospinal fluid

Intermittent IV INF route

- After reconstitution with 10 ml sterile water for inj (500 mg/10 ml); further dilution is needed for IV, 500 mg/100 ml 0.9% NaCl, D_5W given as intermittent inf over 1 hr; decrease rate of inf if red-man syndrome occurs

Continuous IV INF route

- May infuse 1-2 g in volume to give over 24 hr if intermittent IV route cannot be used

Y-site compatibilities: Acyclovir, allopurinol, amifostine, amiodarone, amsacrine, atracurium, cisatracurium, cyclophosphamide, diltiazem, DOXOrubicin liposome, enalaprilat, esmolol, filgrastim, fluconazole, fludarabine, gallium, granisetron, HYDROmorphone, insulin (regular), labetalol, LORazepam, magnesium sulfate, melphalan, meperidine, meropenem, midazolam, morphine, ondansetron, PACLitaxel, pancuronium, perphenazine, propofol, remifentanil, sodium bicarbonate, tacrolimus, teniposide, theophylline, thiotepa, tolazoline, vecuronium, vinorelbine, warfarin, zidovudine

SIDE EFFECTS

CV: Cardiac arrest, vascular collapse (rare), hypotension

EENT: *Ototoxicity, permanent deafness,* tinnitus, nystagmus

GI: Nausea, pseudomembranous colitis

GU: Nephrotoxicity, *increased BUN, creatinine, albumin,* fatal uremia

HEMA: Leukopenia, eosinophilia, neutropenia

INTEG: Chills, fever, rash, thrombophlebitis at inj site, urticaria, pruritus, necrosis (red-man syndrome), skin/subcutaneous tissue disorders

RESP: Wheezing, dyspnea

SYST: Anaphylaxis, superinfection

PHARMACOKINETICS

PO: Absorption poor

IV: Onset rapid, peak 1 hr, half-life 4-8 hr, excreted in urine (active form)

INTERACTIONS

Increase: ototoxicity or nephrotoxicity—aminoglycosides, cephalosporins, colis-

V

tin, polymyxin, bacitracin, CISplatin, amphotericin B, cidofovir
Increase: neuromuscular effects—nondepolarizing muscle relaxants
Drug/Lab Test
Increase: BUN/creatinine, eosinophils
Decrease: WBC

NURSING CONSIDERATIONS

Assess:
• **Infection:** WBC, urine, stools, sputum, characteristics of wound throughout treatment
• I&O ratio; report hematuria, oliguria; nephrotoxicity may occur, BUN, creatinine
• Serum levels: peak 1 hr after 1-hr inf 25-40 mg/L, trough before next dose 5-10 mg/L, especially in renal disease
• C&S
• Auditory function during, after treatment; hearing loss, ringing, roaring in ears; product should be discontinued
• B/P during administration; sudden drop may indicate red-man syndrome
• Skin eruptions
• **Red man syndrome:** flushing of neck, face, upper body, arms, back, may lead to anaphylaxis; slow IV infusion to >1 hr
Perform/provide:
• Storage at room temp for ≤2 wk after reconstitution
• EPINEPHrine, suction, tracheostomy set, endotracheal intubation equipment on unit; anaphylaxis may occur
• Adequate intake of fluids (2 L/day) to prevent nephrotoxicity
Evaluate:
• Therapeutic response: absence of fever, sore throat; negative culture
Teach patient/family:
• About all aspects of product therapy; about the need to complete entire course of medication to ensure organism death (7-10 days); that culture may be taken after completed course of medication
• To report sore throat, fever, fatigue; could indicate superinfection
• That product must be taken in equal intervals around the clock to maintain blood levels

vardenafil (Rx)

(var-den'a-fil)
Levitra, Staxyn
Func. class.: Erectile dysfunction agent
Chem. class.: Phosphodiesterase type 5 inhibitor

ACTION: Inhibits phosphodiesterase type 5 (PDE5), enhances erectile function by increasing the amount of cGMP, which in turn causes smooth muscle relaxation and increased blood flow into the corpus cavernosum

USES: Treatment of erectile dysfunction

CONTRAINDICATIONS: Hypersensitivity, coadministration of α-blockers or nitrates, renal failure, congenital or acquired QT prolongation
Precautions: Pregnancy (B); not indicated for women, children, or newborns; hepatic impairment, retinitis pigmentosa, anatomical penile deformities, sickle cell anemia, leukemia, multiple myeloma, bleeding disorders, active peptic ulceration, CV/renal disease

DOSAGE AND ROUTES

• **Adult: PO** 10 mg taken 1 hr before sexual activity; dose may be reduced to 5 mg or increased to max 20 mg; max dosing frequency once daily; orally disintegrating tab 10 mg 60 min before sexual activity; do not use with potent CYP3A4 inhibitors
• **Geriatric >65 yr: PO** 5 mg initially, titrated as needed/tolerated
Hepatic dose
• **Adult: PO** (Child-Pugh B) 5 mg, max 10 mg/day
Concomitant medications
• Ritonavir, max 2.5 mg q72hr; for indinavir, ketoconazole 400 mg/day and itraconazole 400 mg/day, max 2.5 mg/day; for ketoconazole 200 mg/day, itracon-

azole 200 mg/day and erythromycin max 5 mg/day

Available forms: Tabs 2.5, 5, 10, 20 mg; orally disintegrating tab 10 mg

Administer:

- Approximately 1 hr before sexual activity; do not use more than once daily; orally disintegrating tabs are not interchangeable with film-coated tabs
- Without regard to food; avoid taking with high-fat meal
- **Oral disintegrating tab:** place on tongue, allow to dissolve, do not use water

SIDE EFFECTS

CNS: *Headache, flushing, dizziness, insomnia,* seizures, transient global amnesia

CV: Hypertension, MI, CV collapse, chest pain

EENT: Conjunctivitis, tinnitus, photophobia, diminished vision, glaucoma, hearing loss

GU: Abnormal ejaculation, priapism

MISC: Rash, GERD, GGTP increased, NAION (nonarteritic ischemic optic neuropathy), dyspepsia

MS: Myalgia, arthralgia, neck pain

RESP: Rhinitis, sinusitis, dyspnea, pharyngitis, epistaxis

PHARMACOKINETICS

Rapidly absorbed, bioavailability 15%, protein binding 95%, metabolized by liver, terminal half-life 4-5 hr, onset 20 min, peak $^1/_2$-$1^1/_2$ hr, duration <5 hr, reduced absorption with high-fat meal, primarily excreted in feces (91%-95%)

INTERACTIONS

⚠ Do not use with nitrates because of unsafe decrease in B/P, which could result in MI or stroke

⚠ Serious dysrhythmias: class IA/III antiarrhythmics, clarithromycin, droperidol, procainamide, quiNIDine, quinolones; do not use concurrently

Increase: hypotension—α-blockers, protease inhibitors, metoprolol, NIFEdipine, alcohol, amLODIPine, angiotensin II receptor blockers; do not use concurrently

Increase: vardenafil levels—erythromycin, azole antifungals (ketoconazole, itraconazole), cimetidine, antiretroviral protease inhibitors

Drug/Food

Decrease: absorption—high-fat meal

Drug/Lab Test

Increase: CK

NURSING CONSIDERATIONS

Assess:

- Erectile dysfunction and cause before treatment

⚠ Any severe loss of vision while taking this or similar products; products should not be used

⚠ Use of organic nitrates that should not be used with this product

Teach patient/family:

- That product does not protect against STDs, including HIV
- That product absorption is reduced with high-fat meal
- That product should not be used with nitrates in any form; to inform physician of all medications being taken
- That product has no effect in the absence of sexual stimulation; that patient should seek immediate medical attention if erections last >4 hr

⚠ To notify prescriber immediately and stop taking product if vision loss occurs

varenicline (Rx)

(var-e-ni'kleen)

Champix ✤, Chantix

Func. class.: Smoking cessation agent

Chem. class.: Nicotine receptor agonist

V

ACTION: Partial agonist for nicotine receptors; partially activates receptors to help curb cravings; occupies receptors to prevent nicotine binding

USES: Smoking deterrent

CONTRAINDICATIONS

Hypersensitivity, eating disorders

Precautions: Pregnancy (C), breastfeeding, children <18 yr, geriatric patients, renal disease, recent MI, angioedema

Black Box Warning: Bipolar disorder, depression, schizophrenia, suicidal ideation

DOSAGE AND ROUTES

Smoking cessation

- **Adult: PO** therapy should begin 1 wk prior to smoking stop date (i.e., take product plus tobacco for 7 days); titrate for 1 wk; days 1 through 3, 0.5 mg/day; days 4 through 7, 0.5 mg bid; day 8 through end of treatment, 1 mg bid; treatment is for 12 wk and may be repeated for another 12 wk

Renal dose

- **Adult: PO** CCr ≤50 ml/min, titrate to max 0.5 mg bid

Available forms: Tabs 0.5, 1 mg; Chantix continuing month PAK; Chantix starting month PAK

Administer:

- Do not break, crush, or chew tabs
- Increased fluids, bulk in diet if constipation occurs
- After eating with a full glass of water
- Sugarless gum, hard candy, or frequent sips of water for dry mouth

SIDE EFFECTS

CNS: Headache, agitation, dizziness, insomnia, abnormal dreams, fatigue, malaise, behavior changes, depression, suicidal ideation, suicide, amnesia, hallucinations, hostility, mania, psychosis, tremor

CV: Dysrhythmias, hypo/hypertension, palpitations, tachycardia, angina, MI

EENT: *Blurred vision,* tinnitus

GI: *Nausea, vomiting,* anorexia, *dry mouth,* increased/decreased appetite, *constipation,* flatulence, GERD

GU: Erectile dysfunction, urinary frequency, menstrual irregularities

INTEG: Rash, pruritus, angioedema, Stevens-Johnson syndrome

MISC: Weight loss or gain

RESP: Dyspnea, rhinorrhea

PHARMACOKINETICS

Elimination half-life 24 hr; metabolism minimal; 93% excreted unchanged in urine; steady state 4 days

NURSING CONSIDERATIONS

Assess:

- **Smoking history:** motivation for smoking cessation, years used, amount each day
- Renal function in geriatric patients; cardiac status in cardiac disease
- Smoking cessation after 12 wk; if progress not made, product may be used for additional 12 wk

Black Box Warning: Neuropsychiatric symptoms: mood, sensorium, affect; behavior changes, agitation, depression, suicidal ideation; suicide has occurred; possible worsening of depression, schizophrenia, bipolar disorder

Evaluate:

- Therapeutic response: smoking cessation

Teach patient/family:

- That treatment for smoking cessation lasts 12 wk and that another 12 wk may be required
- To use caution when driving, performing other activities requiring alertness; blurred vision may occur
- To set a date to quit smoking and to initiate treatment 1 wk before that date
- How to titrate product
- Not to use with nicotine patches unless directed by prescriber; may increase B/P
- To notify prescriber if pregnancy planned or suspected
- About common side effects to be expected

Black Box Warning: To notify prescriber immediately of change in thought/behavior (suicidal ideation, hostility, depression), stop product

vasopressin (Rx)

(vay-soe-press'in)

Pitressin, Pressyn ✱

Func. class.: Pituitary hormone

Chem. class.: Lysine vasopressin

ACTION: Promotes the reabsorption of water via action on the renal tubular epithelium; causes vasoconstriction

USES: Diabetes insipidus (nonnephrogenic/nonpsychogenic), abdominal distention postoperatively, bleeding esophageal varices

CONTRAINDICATIONS: Hypersensitivity, chronic nephritis

Precautions: Pregnancy (C), breastfeeding, CAD, asthma, vascular/renal disease, migraines, seizures

DOSAGE AND ROUTES

Diabetes insipidus

- **Adult: IM/SUBCUT** 5-10 units bid-qid as needed; **CONT IV INF** 0.0005 units/kg/hr (0.05 milliunit/kg/hr), double dose q30min as needed
- **Child: IM/SUBCUT** 2.5-10 units bid-qid as needed; **IM/SUBCUT** 1.25-2.5 units q2-3days (Pitressin Tannate) for chronic therapy

Abdominal distention

- **Adult: IM** 5 units then q3-4hr, increasing to 10 units if needed (aqueous)

Available forms: sol for inj 20 units/ml; 10 units/0.5 ml

SIDE EFFECTS

CNS: Drowsiness, headache, lethargy, flushing, vertigo

CV: Increased B/P, dysrhythmias, cardiac arrest, shock, chest pain, MI

EENT: Nasal irritation, congestion, rhinitis

GI: Nausea, heartburn, cramps, vomiting, flatus

GU: Vulval pain, uterine cramping

MISC: Tremor, sweating, vertigo, urticaria, bronchial constriction

PHARMACOKINETICS

Nasal: Onset 1 hr; duration 3-8 hr; half-life 15 min; metabolized in liver, kidneys; excreted in urine

INTERACTIONS

Increase: antidiuretic effect—tricyclics, carBAMazepine, chloropromide, fludrocortisone, clofibrate, urea

Decrease: antidiuretic effect—lithium, demeclocycline

NURSING CONSIDERATIONS

Assess:

- Pulse, B/P when giving product IV or IM
- I&O ratio, weight daily; fluid/electrolyte balance; check for edema in extremities; if water retention is severe, diuretic may be prescribed
- **Water intoxication:** lethargy, behavioral changes, disorientation, neuromuscular excitability
- Small doses may precipitate coronary adverse effects; keep emergency equipment nearby

Evaluate:

- Therapeutic response: absence of severe thirst, decreased urine output, osmolality

Teach patient/family:

- To measure and record I&O
- To avoid alcohol, all OTC medications unless approved by prescriber

V

vemurafenib

Zelboraf

Func. class.: Biologic response modifiers; signal transduction inhibitors (STIs)

ACTION: Inhibitor of some mutated forms of BRAF serine threonine kinase, thereby blocking cellular proliferation in melanoma cells with the mutation; inhibits other kinases including CRAF, ARAF, wild-type BRAF, SRMA, ACK1, MAP4H5, and FGR; potent adenosine triphosphate-competitice inhibitor of RAFs, with a modest preference for mutant BRAF and CRAF compared with wild-type BRAF

USES: Unresectable or metastatic malignant melanoma with V600E mutation of the BRAF gene

Precautions: Pregnancy (D), breastfeeding, children, infants, neonates, hepatic disease, QT prolongation, secondary malignancy, torsades de pointes, hypokalemia, hypomagnesia, sunlight exposure

DOSAGE AND ROUTES

• **Adult: PO** 960 mg (4 tabs) bid about q12hr

Dose adjustments for toxicity due to symptomatic adverse reactions or QTc prolongation

Grade 1 or tolerable grade 2 adverse events: no dosage change; **intolerable grade 2 or grade 3 adverse events (1st episode):** interrupt treatment until toxicity resolves to grade ≤1, when resuming, reduce dosage to 720 mg (3 tabs) bid; **intolerable grade 2 or grade 3 adverse events (2nd episode):** interrupt treatment until toxicity resolves to grade ≤1, when resuming, reduce dose to 480 mg (2 tabs) bid; **intolerable grade 2 or grade 3 adverse events (3rd episode)** discontinue treatment permanently; **grade 4 adverse events (1st episode):** discontinue permanently or interrupt until toxicity resolves to grade ≤1, when resuming, reduce dose to 480 mg (2 tabs) bid; **grade 4 adverse events (2nd episode):** discontinue permanently

Available forms: Tabs 240 mg

Administer:

• Continue until disease progresses or unacceptable toxicity occurs

• Missed doses can be taken up to 4 hr before the next dose is due, take about 12 hr apart, take without regard to meals

• Swallow whole with a full glass of water, do not crush or chew

SIDE EFFECTS

CNS: Fatigue, fever, asthenia, headache, dizziness, peripheral neuropathy, muscle paralysis

CV: QT prolongation, atrial fibrillation, peripheral edema, hypotension

EENT: Uveitis, blurred vision, iritis, photophobia

GI: Nausea, diarrhea, vomiting, constipation, dysgeusia, decreased appetite, weight loss

INTEG: Alopecia, pruritus, hyperkeratosis, maculopapular rash, actinic keratosis, xerosis/dry skin, papular rash, palmar-plantar erythrodysesthesia (hand and foot syndrome), photosensitivity

MS: Arthralgia, myalgias, extremity pain, musculoskeletal pain, back pain, arthritis

RESP: Cough

SYST: Secondary malignancy, anaphylaxis

PHARMACOKINETICS

>99% protein binding (albumin and alpha-1 acid glycoprotein) an inhibitor of CYP1A2, 2A6, 2C9, 2C19, 2D6, 3A4/5 CYP1A2 inhibitor, a weak CYP2D6 inhibitor, and a CYP3A4 inducer; elimination 94% in feces, 1% in urine, half-life 57 hr

INTERACTIONS

Increase: vemurafenib effect—CYP3A4/CYP1A2 inhibitors (enoxacin, cimetidine, delavirdine, indinavir, isoniazid, itracon-

azole, dalfopristin, quinupristin, tipranavir)

⚠ Increase: QT prolongation, torsades de pointes—arsenic trioxide, certain phenothiazines (chlorproMAZINE, mesoridazine, thioridazine), grepafloxacin, levomethadyl, pentamidine, probucol, sparfloxacin, troleandomycin, class IA antiarrhythmics (disopyramide, procainamide, quiNIDine), class III antiarrhythmics (amiodarone, dofetilide, ibutilide, sotalol), clarithromycin, ziprasidone, pimozide, haloperidol, halofantrine, quiNIDine, chloroquine, dronedarone, droperidol, erythromycin, methadone, posaconazole, propafenone, saquinavir, abarelix, amoxapine, apomorphine, asenapine, β-agonists, ofloxacin, eribulin, ezogabine, flecainide, gatifloxacin, gemifloxacin, halogenated anesthetics, iloperidone, levofloxacin, local anesthetics, magnesium sulfate, potassium sulfate, sodium, maprotiline, moxifloxacin, nilotinib, norfloxacin, ciprofloxacin, OLANZapine, paliperidone, some phenothiazines (fluPHENAZine, perphenazine, prochlorperazine, trifluoperazine), telavancin, tetrabenazine, tricyclic antidepressants, venlafaxine, vorinostat, citalopram, alfuzosin, cloZAPine, cyclobenzaprine, dolasetron, palonosetron, QUEtiapine, rilpivirine, SUNItinib, tacrolimus, vardenafil, indacaterol, dasatinib, fluconazole, lapatinib, lopinavir/ritonavir, mefloquine, octreotide, ondansetron, ranolazine, risperiDONE, telithromycin, vemurafenib

Decrease: vemurafenib effect—CYP3A4 inducers (rifampin, barbiturates, carBAMazepine, phenytoin, erythromycin, ketoconazole, fluvoxaMINE, alcohol, etravirine, ritonavir, bexarotene, rifabutin, OXcarbazepine, nevirapine, modafinil, metyrapone)

Drug/Lab Test:

Increase: serum creatinine, LFTs, alkaline phosphatase, bilirubin

NURSING CONSIDERATIONS

Assess:

- **Hepatic Disease:** Liver function test (LFT) abnormalities, altered bilirubin levels, may occur; monitor LFTs and bilirubin levels before treatment, then monthly; more frequent testing is needed in those with grade 2 or greater toxicities; laboratory alterations should be managed with dose reduction, treatment interruption, or discontinuation

⚠ QT prolongation: has been reported with the use of this product; therefore, should be avoided in patients with QT prolongation; monitor ECG and electrolytes in those with congestive heart failure, bradycardia, electrolyte imbalance (hypokalemia, hypomagnesemia), or those who are taking concomitant medications known to prolong the QT interval; treatment interruption, dosage adjustment, treatment discontinuation may be needed in those who develop QT prolongation

⚠ Pregnancy/breastfeeding: Identify if pregnancy is planned or suspected, pregnancy category D, avoid breastfeeding

- Serum electrolytes

Perform/provide:

- Storage at room temperature, in original container

Evaluate:

- Decreased spread of malignancy

Teach patient/family:

- Teach patient missed doses can be taken up to 4 hr before the next dose is due to maintain the twice-daily regimen

⚠ Teach patient to use reliable contraception; both women and men of childbearing age should use adequate contraceptive methods during therapy and for at least 90 days after completing treatment, pregnancy category D

V

venlafaxine (Rx)

(ven-la-fax'een)

Effexor ♣, Effexor XR

Func. class.: Antidepressant—SNRI

Chem. class.: SNRI

ACTION: Potent inhibitor of neuronal serotonin and norepinephrine uptake, weak inhibitor of dopamine; no muscarinic, histaminergic, or α-adrenergic receptors in vitro

USES: Prevention/treatment of major depression; depression at the end of life; long-term treatment of general anxiety disorder, panic disorder, social anxiety disorder (Effexor XR only)

Unlabeled uses: Hot flashes, premenstrual dysphoric disorder (PMDD), headache, neuropathic pain, fibromyalgia, diabetic neuropathy

CONTRAINDICATIONS: Hypersensitivity, bipolar disorder, interstitial lung disease

Precautions: Pregnancy (C), breastfeeding, geriatric patients, mania, hypertension, seizure disorder, recent MI, cardiac/renal/hepatic disease, eosinophilic pneumonia, desvenlafaxine hypersensitivity

Black Box Warning: Children, suicidal ideation

DOSAGE AND ROUTES

Depression

• **Adult: PO** 75 mg/day in 2-3 divided doses; taken with food, may be increased to 150 mg/day; if needed, may be further increased to 225 mg/day; increments of 75 mg/day at intervals of ≥4 days; some hospitalized patients may require up to 375 mg/day in 3 divided doses; **EXT REL** 37.5-75 mg PO daily, max 225 mg/day; give XR daily

Anxiety disorders

• **Adult: PO** 75 mg/day or 37.5 mg/day × 4-7 days initially, max 225 mg/day

Renal dose

• **Adult: PO** CCr 10-70 ml/min, reduce dose by 25%-50%; CCr <10 ml/min, reduce dose by 50%

Hepatic dose

• **Adult: PO** Moderate impairment, 50% of dose

Hot flashes (unlabeled)

• **Adult (male, prostate cancer): PO** 12.5 mg bid × 4 wk; females 37.5-75 mg/day

Neuropathic pain, diabetic neuropathy, headache, fibromyalgia (unlabeled)

• **Adult: PO** 37.5-75 mg/day, max 75 mg bid (regular rel) or 150 mg/day (ext rel)

Premenstrual dysphoric disorder (PMDD) (unlabeled)

• **Adult female: PO** 50-200 mg/day, start at 50 mg/day for 1st cycle, titrate upward

Available forms: Tabs scored 25, 37.5, 50, 75, 100 mg; ext rel cap (Effexor XR) 37.5, 75, 150 mg; ext rel tab 37.5, 75, 150, 225 mg

Administer:

• With food, milk for GI symptoms; do not crush, chew caps; caps can be opened and contents sprinkled on applesauce, given with full glass of water

• Sugarless gum, hard candy, frequent sips of water for dry mouth

• Avoid use with CNS depressants

• In small amounts because of suicide potential, especially at beginning of therapy

SIDE EFFECTS

CNS: Emotional lability, *vertigo, dizziness, weakness,* apathy, ataxia, CNS stimulation, euphoria, hallucinations, hostility, increased libido, hypertonia, hypotonia, psychosis, insomnia, anxiety, suicidal ideation in children/adolescents, seizures, neuroleptic-malignant-syndrome–like reaction

CV: *Migraine,* angina pectoris, hypertension, sustained hypertension, change in QTc interval, increased pulse, increased cholesterol, extrasystoles, postural hypotension, syncope, thrombophlebitis

EENT: *Abnormal vision,* taste, *ear pain,* cataract, conjunctivitis, corneal lesions, dry eyes, otitis media, photophobia
GI: *Dysphagia, eructation,* nausea, anorexia, dry mouth, colitis, gastritis, gingivitis, rectal hemorrhage, stomatitis, stomach and mouth ulceration
GU: *Anorgasmia,* abnormal ejaculation, *dysuria, hematuria, metrorrhagia, vaginitis, impaired urination,* albuminuria, amenorrhea, kidney calculus, cystitis, nocturia, breast and bladder pain, polyuria, uterine hemorrhage, vaginal hemorrhage, moniliasis
HEMA: Agranulocytosis, aplastic anemia, neutropenia, pancytopenia, abnormal bleeding
INTEG: Ecchymosis, acne, alopecia, brittle nails, dry skin, photosensitivity, sweating, angioedema (ext rel)
META: *Peripheral edema, weight loss or gain,* diabetes mellitus, edema, glycosuria, hyperlipemia, hypokalemia
MS: Arthritis, bone pain, bursitis, myasthenia, tenosynovitis, arthralgia
RESP: *Bronchitis, dyspnea,* asthma, chest congestion, epistaxis, hyperventilation, laryngitis
SYST: *Malaise, neck pain,* enlarged abdomen, cyst, facial edema, hangover, hernia

PHARMACOKINETICS

Well absorbed; extensively metabolized in liver by CYP2D6 to active metabolite; 87% of product recovered in urine; 27% protein binding; half-life 5, 11 hr (active metabolite), respectively

INTERACTIONS

⚠ Hyperthermia, rigidity, rapid fluctuations of vital signs, mental status changes, neuroleptic malignant syndrome: MAOIs
Increase: bleeding risk—salicylates, NSAIDs, platelet inhibitors, anticoagulants
Increase: venlafaxine effect—cimetidine
Increase: CNS depression—alcohol, opioids, antihistamines, sedative/hypnotics
Increase: levels of cloZAPine, desipramine, haloperidol, warfarin
Increase: serotonin syndrome—sibutramine, SUMAtriptan, traZODone, traMADol, SSRIs, serotonin receptor agonist, linezolid, methylene blue, tryptophan
Decrease: effect of indinavir
Decrease: venlafaxine effect—cyproheptadine

Drug/Herb

• Serotonin syndrome: St. John's wort, tryptophan
Increase: CNS depression—kava, valerian

Drug/Lab Test

Increase: alk phos, bilirubin, AST, ALT, BUN, creatinine, serum cholesterol, CPK, LDH
False positive: amphetamines, phencyclidine

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Mental status: mood, sensorium, affect, increase in psychiatric symptoms; depression, panic; assess for suicidal ideation in children/adolescents

• B/P lying, standing; pulse q4hr; if systolic B/P drops 20 mm Hg, hold product, notify prescriber; take VS q4hr in patients with CV disease
⚠ **Bleeding:** GI, ecchymosis, epistaxis, hematomas, petechiae, hemorrhage
• Blood studies: CBC, differential, leukocytes, cardiac enzymes if patient is receiving long-term therapy
• Hepatic studies: AST, ALT, bilirubin
• Weight weekly; weight loss or gain; appetite may increase; peripheral edema may occur; monitor cholesterol
• **Withdrawal symptoms:** flulike symptoms, headache, nervousness, agitation, nausea, vomiting, muscle pain, weakness; not usual unless product is discontinued abruptly
⚠ **Serotonin syndrome, neuroleptic malignant syndrome:** increased heart rate, shivering, sweating, dilated pupils, tremors, high B/P, hyperthermia, head-

V

ache, confusion; if these occur, stop product, administer serotonin antagonist if needed, usually worse if given with linezolid, methylene blue, tryptophan

Perform/provide:

- Storage in tight container at room temp; do not freeze
- Assistance with ambulation during beginning therapy because drowsiness, dizziness occur

Evaluate:

- Therapeutic response: decreased depression, anxiety; increased well-being

Teach patient/family:

- To notify prescriber of rash, hives, allergic reactions, bleeding
- To use with caution when driving, performing other activities requiring alertness because of drowsiness, dizziness, blurred vision

Black Box Warning: That worsening of symptoms, suicidal thoughts/behaviors may occur in children/young adults

- To avoid alcohol ingestion
- Not to discontinue medication abruptly after long-term use; may cause nausea, headache, malaise
- To wear sunscreen or large hat because photosensitivity occurs
- To avoid pregnancy or breastfeeding while taking this product, birth defects have occurred when used in the 3rd trimester
- To monitor B/P with hypertension

TREATMENT OF OVERDOSE:

ECG monitoring; lavage, activated charcoal; administer anticonvulsant; may require whole-bowel irrigation for ext rel product

verapamil (Rx)

(ver-ap'a-mill)

Apo-Verap ♣, Calan, Calan SR, Covera-HS ♣, Isoptin SR, Nu-Verap ♣, Verelan, Verelan PM

Func. class.: Calcium channel blocker; antihypertensive; antianginal, antidysrhythmic (class IV)

Chem. class.: Diphenylalkylamine

ACTION: Inhibits calcium ion influx across cell membrane during cardiac depolarization; produces relaxation of coronary vascular smooth muscle; dilates coronary arteries; decreases SA/AV node conduction; dilates peripheral arteries

USES: Chronic stable, vasospastic, unstable angina; dysrhythmias, hypertension, supraventricular tachycardia, atrial flutter or fibrillation

Unlabeled uses: Prevention of migraine headaches, claudication, mania

CONTRAINDICATIONS: Sick sinus syndrome, 2nd-/3rd-degree heart block, hypotension <90 mm Hg systolic, cardiogenic shock, severe CHF, Lown-Ganong-Levine syndrome, Wolff-Parkinson-White syndrome

Precautions: Pregnancy (C), breastfeeding, children, geriatric patients, CHF, hypotension, hepatic injury, renal disease, concomitant β-blocker therapy

DOSAGE AND ROUTES

Angina

- **Adult: PO** 80-120 mg tid, increase weekly, max 480 mg/day

Dysrhythmias

- **Adult: PO** 240-480 mg/day in 3-4 divided doses in digitalized patients
- **Adult: IV BOL** 5-10 mg (0.075-0.15 mg/kg) over 2 min, may repeat 10 mg (0.15 mg/kg) ½ hr after 1st dose

• **Child 1-15 yr: IV BOL** 0.1-0.3 mg/kg over ≥2 min, repeat in 30 min, max 5 mg in single dose
• **Child 0-1 yr: IV BOL** 0.1-0.2 mg/kg over ≥2 min, may repeat after 30 min

Hypertension

• **Adult: PO** 80 mg tid, may titrate upward; **EXT REL** 120-240 mg/day as single dose, may increase to 240-480 mg/day

Hepatic disease/geriatric patients/compromised ventricular function

• **Adult: PO** 40 mg tid initially, increase as tolerated

Claudication due to PVD (unlabeled)

• **Adult: PO** 120-480 mg/day in divided doses

Mania (unlabeled)

• **Adult: PO** 160-320 mg/day in divided doses, may be given with lithium

Migraine prophylaxis (unlabeled)

• **Adult: PO** 80 mg tid

Available forms: Tabs 40, 80, 120 mg; ext rel tabs 120, 180, 240 mg; inj 2.5 mg/ml in ampules, syringes, vials; ext rel caps 100, 200, 240, 300 mg

Administer:

PO route

• **Reg rel:** Give without regard to food

Ext rel route

• Do not crush or chew ext rel products; caps may be opened and contents sprinkled on food; do not dissolve chew cap contents
• Before meals, at bedtime; give ext rel product with food

Direct IV route

• Undiluted through Y-tube or 3-way stopcock of compatible sol; give over 2 min or 3 min for geriatric patients, with continuous ECG and B/P monitoring, discard unused solution
• Do not use IV with IV β-blockers, may cause AV nodal blockade

Y-site compatibilities: Alfentanil, amikacin, argatroban, ascorbic acid, atracurium, atropine, aztreonam, bivalirudin, bumetanide, buprenorphine, butorphanol, calcium chloride/gluconate, CARBOplatin, caspofungin, ceFAZolin, cefonicid, cefotaxime, cefoTEtan, cefOXitin, ceftizoxime, cefTRIAXone, cefuroxime, chlorproMAZINE, cimetidine, ciprofloxacin, clindamycin, cyanocobalamin, cyclophosphamide, cycloSPORINE, cytarabine, DACTINomycin, DAPTOmycin, dexamethasone, dexmedetomidine, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, DOPamine, doxacurium, DOXOrubicin hydrochloride, doxycycline, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, epoetin alfa, eptifibatide, erythromycin, esmolol, etoposide, etoposide phosphate, famotidine, fenoldopam, fentaNYL, fluconazole, fludarabine, gemcitabine, gentamicin, glycopyrrolate, granisetron, heparin, hydrALAZINE, hydrocortisone, HYDROmorphone, ifosfamide, imipenem/cilastatin, inamrinone, insulin, isoproterenol, ketorolac, labetalol, levofloxacin, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, meperidine, metaraminol, methotrexate, methoxamine, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, miconazole, midazolam, milrinone, mitoXANtrone, morphine, multivitamins, nalbuphine, naloxone, nesiritide, nitroglycerin, nitroprusside, norepinephrine, octreotide, ondansetron, oxaliplatin, oxytocin, PACLitaxel, palonosetron, papaverine, PEMEtrexed, penicillin G, pentamidine, pentazocine, phentolamine, phenylephrine, phytonadione, piperacillin/tazobactam, potassium chloride, procainamide, prochlorperazine, promethazine, propranolol, protamine, pyridoxime, quinupristin/dalfopristin, ranitidine, rocuronium, sodium acetate, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiamine, ticarcillin/clavulanate, tirofiban, tobramycin, tolazoline, trimethaphan, urokinase, vancomycin, vasopressin, vecuronium, vinCRIStine, vinorelbine, voriconazole

V

SIDE EFFECTS

CNS: *Headache, drowsiness,* dizziness, anxiety, depression, weakness, insomnia, confusion, lightheadedness, asthenia, fatigue
CV: *Edema,* CHF, bradycardia, hypotension, palpitations, AV block, dysrhythmias
GI: *Nausea,* diarrhea, gastric upset, *constipation,* increased LFTs
GU: Impotence, gynecomastia, nocturia, polyuria
HEMA: Bruising, petechiae, bleeding
INTEG: Rash, bruising
MISC: Gingival hyperplasia
SYST: Stevens-Johnson syndrome

PHARMACOKINETICS

Metabolized by liver, excreted in urine (70% as metabolites)
PO: Onset variable; peak 3-4 hr; duration 17-24 hr; half-life (biphasic) 4 min, 3-7 hr (terminal)
IV: Onset 3 min, peak 3-5 min, duration 10-20 min

INTERACTIONS

Increase: hypotension—prazosin, quiNIDine, fentaNYL, other antihypertensives, nitrates
Increase: effects of verapamil—β-blockers, cimetidine, clarithromycin, erythromycin, monitor for CV effects
Increase: levels of digoxin, theophylline, cycloSPORINE, carBAMazepine, nondepolarizing muscle relaxants
Decrease: effects of lithium
Decrease: antihypertensive effects—NSAIDs

Drug/Food

Increase: hypotensive effects—grapefruit juice

Drug/Herb

Increase: verapamil effect—ginseng, ginkgo
Increase: hypertension ephedra (ma huang)
Decrease: verapamil effect—St. John's wort

Drug/Lab Test

Increase: AST, ALT, alk phos, BUN, creatinine, serum cholesterol

NURSING CONSIDERATIONS

Assess:

- **Cardiac status:** B/P, pulse, respiration, ECG intervals (PR, QRS, QT); notify prescriber if pulse <50 bpm, systolic B/P <90 mm Hg

⚠ **CHF:** I&O ratios, weight daily; crackles, weight gain, dyspnea, jugular venous distention

- Renal, hepatic studies during long-term treatment, serum potassium periodically

Evaluate:

- Therapeutic response: decreased anginal pain, decreased B/P, dysrhythmias

Teach patient/family:

- To increase fluids, fiber to counteract constipation
- How to take pulse, B/P before taking product; to keep record or graph
- To avoid hazardous activities until stabilized on product, dizziness no longer a problem
- To limit caffeine consumption; to avoid alcohol products
- To avoid OTC or grapefruit products unless directed by prescriber
- To comply with all areas of medical regimen: diet, exercise, stress reduction, product therapy
- To change positions slowly to prevent syncope
- Not to discontinue abruptly, chest pain may occur

⚠ To report chest pain, palpitations, irregular heart beats, swelling of extremities, skin irritation, rash, tremors, weakness

- To notify prescriber if pregnancy is planned; may breastfeed (American Academy of Pediatrics)
- That cap (Covera-HS) may appear in stool

TREATMENT OF OVERDOSE:
Defibrillation, atropine for AV block, vasopressor for hypotension, IV calcium

vidarabine ophthalmic
See Appendix B

vigabatrin (Rx)
(vye-ga'ba-trin)
Sabril
Func. class.: Anticonvulsant
Chem. class.: GABA transaminase inhibitor

ACTION:
May inhibit reuptake and metabolism of GABA, may increase seizure threshold; structurally similar to GABA

USES:
Adjunct treatment of partial seizures in adults and children ≥12 yr, infantile spasm

CONTRAINDICATIONS:
Hypersensitivity to this product
Precautions: Pregnancy (C), breastfeeding, children <2 yr, geriatric patients, renal/hepatic disease, suicidal thoughts/behaviors, abrupt discontinuation

Black Box Warning: Visual disturbance

DOSAGE AND ROUTES
Partial seizures
• **Adult: PO** 500 mg bid, titrate in 500-mg increments at weekly intervals up to 1.5 g bid
Infantile spasm
• **Infant >1 mo, child ≤2 yr: PO** 50 mg/kg/day in 2 divided doses, titrate in 25 to 50-mg/kg/day increments q3days, max 150 mg/kg/day
Renal dose
• **Adult: PO** CCr 50-80 ml/min, reduce dose by 25%; CCr 30-50 ml/min, reduce dose by 50%; CCr 10-30 ml/min, reduce dose by 75%

Available forms: Tabs 500 mg; powder for oral solution 500 mg
Administer:
PO route (tab)
• Give without regard to meals
PO route (oral sol)
• Reconstitute immediately before using
• Empty contents of appropriate number of packets into clean cup
• For each packet, dissolve 10 ml water, conc 50 mg/ml; do not use other liquids
• Stir until dissolved, sol should be clear
• Use calibrated oral syringe to measure correct dosage
• Discard any unused sol

SIDE EFFECTS
CNS: *Dizziness,* irritability, lethargy, malignant hyperthermia, insomnia
CV: Edema
EENT: Visual impairment
GI: Nausea, vomiting, diarrhea, increased appetite, abdominal pain, GI bleeding, hemorrhoids, weight gain, constipation
HEMA: Anemia
INTEG: Pruritus, rash
RESP: Coughing, respiratory depression, pulmonary embolism

PHARMACOKINETICS
Absorption >95%, no protein binding, widely distributed, not metabolized, excretion in urine 80% parent drug, excretion slowed in renal disease, peak 2 hr, half-life 7.5 hr

INTERACTIONS
Increase: CNS depression—CNS depressants
Increase: Serious ophthalmic effects (glaucoma, retinopathy): azaTHIOprine, chloroquine, corticosteroids, deferoxamine, ethambutol, hydroxychloroquine, interferons, loxapine, mecasermin, rh-IGF-1, pentostatin, phenothiazine, phosphodiesterase inhibitors, tamoxifen, thiothixene; avoid concurrent use

V

NURSING CONSIDERATIONS

Assess:
- Renal studies: urinalysis, BUN, urine creatinine q3mo
- Hepatic studies: ALT, AST, bilirubin
- Description of seizures: location, duration, presence of aura
- Mental status: mood, sensorium, affect, behavioral changes; if mental status changes, notify prescriber

Perform/provide:
- Storage at room temp
- Assistance with ambulation during early part of treatment; dizziness occurs
- Seizure precautions: padded side rails; move objects that may harm patient

Evaluate:
- Therapeutic response: decreased seizure activity; document on patient's chart

Teach patient/family:
- To carry emergency ID stating patient's name, products taken, condition, prescriber's name and phone number
- To avoid driving, other activities that require alertness
- Not to discontinue medication quickly after long-term use
- To notify prescriber if pregnancy is planned or suspected

vilazodone (Rx)

(vil-az'oh-done)

Viibryd

Func. class.: Antidepressant, miscellaneous

ACTION: Novel antidepressant unrelated to other antidepressants, enhances serotonergic action by a dual mechanism

USES: Major depression

CONTRAINDICATIONS: Concomitant use of MOA inhibitors or within 14 days after discontinuing MOA inhibitor or within 14 days after discontinuing vilazodone

Precautions: Pregnancy (C), labor, infants, geriatric patients, abrupt discontinuation, bipolar disorder, bleeding, operating machinery, ECT, hepatic disease, hyponatremia, hypovolemia, substance abuse, history of seizures, serotonin syndrome, neuroleptic malignant syndrome; use with serotonin precursors (e.g., tryptophan) or serotonergic drugs; suicidal ideation, worsening depression or behavior

Black Box Warning: Children, suicidal ideation

DOSAGE AND ROUTES

- **Adult: PO** 10 mg × 7 days, then 20 mg × 7 days, then 40 mg/day; if taking potent CYP3A4 inhibitor, max 20 mg/day

Available forms: Tabs 10, 20, 40 mg

Administer:
- With food to increase absorption
- Do not use within 2 wk of MAOIs

SIDE EFFECTS

CNS: Restlessness, dizziness, drowsiness, fatigue, mania, insomnia, migraine, neuroleptic-malignant–like syndrome, paresthesias, seizures, suicidal ideation, tremor, night sweats, dream disorders

EENT: Cataracts, blurred vision

GI: Nausea, vomiting, flatulence, diarrhea, xerostomia, altered taste, gastroenteritis

GU: Decreased libido, ejaculation disorder, increased frequency of urination, sexual dysfunction

HEMA: Bleeding, decreased platelets

MS: Arthralgia

SYST: Neonatal abstinence syndrome, withdrawal, serotonin syndrome

INTERACTIONS

⚠ Do not use within 2 wk of MAO inhibitors

⚠ **Increased:** serotonin syndrome—SSRIs, SNRIs, serotonin receptor agonists, selegiline, busPIRone, dextromethorphan, ergots, fenfluramine, dexfluramine, lithium, meperidine, fentaNYL, methyl-

phenidate, dexmethylphenidate, metoclopramide, mirtazapine, nefazodone, pentazocine, phenothiazines, haloperidol, loxapine, thiothixene, molindone, amphetamines
Increased: bleeding—anticoagulants, thrombolytics, platelet inhibitors, salicylates, NSAIDs
Increased: vilazodone levels—CYP3A4 inhibitors (ketoconazole, erythromycin, efavirenz, dronedarone, clarithromycin and others)
Decrease: vilazodone effect—CYP3A4 inducers
Drug/Food
• Avoid use with grapefruit juice
Drug/Herb
Increased: serotonin syndrome—St. John's wort

PHARMACOKINETICS

Protein binding 96%-99%, metabolized by liver by CYP3A4 (major) and CYP2C19 and CYP2D (minor) and non-CYP pathways, peak 4-5 hr, half-life 25 hr

NURSING CONSIDERATIONS

Assess:
Black Box Warning: Mental status: orientation, mood behavior initially and periodically; initiate suicide precautions if indicated; history of seizures, mania
• Renal/hepatic status: hyponatremia
• **Abrupt discontinuation:** Do not discontinue abruptly, taper, monitor for symptoms of withdrawal; if intolerable, resume previous dose and decrease more slowly
• Serotonin syndrome/neuroleptic malignant syndrome: nausea, vomiting, sedation, sweating, facial flushing, high B/P; discontinue product
Perform/provide:
• Storage at room temp, away from moisture, heat
Evaluate:
• Therapeutic response: remission of depressive symptoms
Teach patient/family:
• To take as directed; not to double dose
• To avoid abrupt discontinuation unless approved by prescriber
• Not to drive or operate machinery until effects are known
• Not to use other products unless approved by prescribed
⚠ To contact prescriber regarding the following: allergic reactions; personality changes (aggression, anxiety, anger, hostility); extreme sleepiness or drowsiness; feeling confused, nervous, restless or clumsy; numbness, tingling, or burning pain in hands, arms, legs, or feet; tremors; unusual behavior or thoughts about hurting oneself
• To notify prescriber if pregnancy is planned or suspected; avoid breastfeeding

⚠ HIGH ALERT

vinBLAStine (VLB) (Rx)

(vin-blast'een)
Func. class.: Antineoplastic
Chem. class.: Vinca alkaloid

Do not confuse:
vinBLAStine/vinCRIStine/vinorelbine

ACTION: Inhibits mitotic activity, arrests cell cycle at metaphase; inhibits RNA synthesis, blocks cellular use of glutamic acid needed for purine synthesis; vesicant

USES: Breast, testicular cancer, lymphomas, neuroblastoma; Hodgkin's/non-Hodgkin's lymphoma; mycosis fungoides, histiocytosis, Kaposi's sarcoma, Langerhans cell histiocytosis
Unlabeled uses: Lung, bladder, prostate cancer; desmoid tumor, malignant melanoma

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, infants, hypersensitivity, leukopenia, granulocytopenia, bone marrow suppression, infection

V

Black Box Warning: Intrathecal use

Precautions: Renal/hepatic disease, tumor lysis syndrome

Black Box Warning: Extravasation

DOSAGE AND ROUTES

Breast cancer

• **Adult: IV** 4.5 mg/m² on day 1 of every 21 days in combination with DOXOrubicin and thiotepa

Hodgkins disease

• **Adult: IV** 6 mg/m² on days 1 and 15 of every 28 days with DOXOrubicin, bleomycin, dacarbazine (ABVD regimen)

• **Child: IV** 2.5-6 mg/m²/day once q1-2wk × 3-6 wk, max weekly dose 12.5 mg/m²

Available forms: Inj, powder 10 mg for 10 ml IV; sol for inj 1 mg/ml

Administer:

• Antiemetic 30-60 min before product and prn to prevent vomiting

Black Box Warning: Hyaluronidase 150 units/ml in 1 ml NaCl, warm compress for extravasation for vesicant activity treatment

Black Box Warning: Do not administer intrathecally; fatal

IV inj route

• After diluting 10 mg/10 ml NaCl; give through Y-tube or 3-way stopcock or directly over 1 min

Intermittent IV INF route

• Further dilute in 50-100 ml of NS, infuse over 15-30 min

Additive compatibilities: Bleomycin

Syringe compatibilities: Bleomycin, CISplatin, cyclophosphamide, droperidol, fluorouracil, leucovorin, methotrexate, metoclopramide, mitoMYcin, vinCRIStine

Y-site compatibilities: Allopurinol, amifostine, amphotericin B cholesteryl, aztreonam, bleomycin, CISplatin, cyclophosphamide, DOXOrubicin, DOXOrubicin liposome, droperidol, filgrastim, fludarabine, fluorouracil, granisetron, heparin, leucovorin, melphalan, methotrexate, metoclopramide, mitoMYcin, ondansetron, PACLitaxel, piperacillin/tazobactam, sargramostim, teniposide, thiotepa, vinCRIStine, vinorelbine

SIDE EFFECTS

CNS: Paresthesias, peripheral neuropathy, depression, headache, seizures, malaise

CV: Tachycardia, orthostatic hypo/hypertension

GI: *Nausea, vomiting,* ileus, *anorexia, stomatitis, constipation,* abdominal pain, GI/rectal bleeding, hepatotoxicity, pharyngitis

GU: Urinary retention, renal failure, hyperuricemia

HEMA: Thrombocytopenia, leukopenia, myelosuppression, agranulocytosis, granulocytosis, aplastic anemia, neutropenia, pancytopenia

INTEG: *Rash, alopecia,* photosensitivity, extravasation, tissue necrosis

META: SIADH

RESP: Fibrosis, pulmonary infiltrate, bronchospasm

SYST: Tumor lysis syndrome (TLS)

PHARMACOKINETICS

Half-life (triphasic) <5 min, 50-155 min, 23-85 hr; metabolized in liver; excreted in urine, feces; crosses blood-brain barrier

INTERACTIONS

Increase: Synergism: bleomycin

Increase: Bronchospasm: mitoMYcin

• Do not use with radiation

Increase: bleeding risk—NSAIDs, anticoagulants, thrombolytics, antiplatelets

Increase: toxicity, bone marrow suppression—antineoplastics

Increase: action of methotrexate

Increase: adverse reactions—live virus vaccines

Increase: toxicity—CYP3A4 inhibitors (aprepitant, antiretroviral protease inhibitors, clarithromycin, danazol, delavirdine, diltiazem, erythromycin, fluconazole, FLUoxetine, fluvoxaMINE, imatinib, ketoconazole, mibefradil, nefazodone, telithromycin, voriconazole)

Decrease: vinBLAStine effect—CYP3A4 inducers (barbiturates, bosentan, carBAMazepine, efavirenz, phenytoins, nevirapine, rifabutin, rifampin)

Drug/Herb

- Avoid use with St. John's wort

Drug/Lab Test

Increase: uric acid, bilirubin

Decrease: Hgb, platelets, WBC

NURSING CONSIDERATIONS

Assess:

⚠ CBC, differential, platelet count weekly; withhold product if WBC is $<2000/mm^3$ or platelet count is $<75,000/mm^3$; notify prescriber; RBC, Hct, Hgb may be decreased, nadir occurs on days 4-10 and continues for another 1-2 wk

- **Tumor lysis syndrome:** monitor for hyperkalemia, hyperphosphatemia, hyperuricemia; usually occurs with leukemia, lymphoma; alkalinization of the urine, allopurinol should be used to prevent urate nephrophy; monitor electrolytes and renal function (BUN, uric acid, urine CCR)
- Hepatitis: transient hepatitis may occur with continuous IV
- Bleeding: hematuria, guaiac, bruising, petechiae, mucosa or orifices
- **Bronchospasm:** can be life-threatening; usually occurs when giving mitoMYcin
- Effects of alopecia on body image; discuss feelings about body changes
- Sensitivity of feet/hands, which precedes neuropathy
- Jaundiced skin, sclera; dark urine, clay-colored stools, itchy skin, abdominal pain, fever, diarrhea
- Buccal cavity q8hr for dryness, sores, ulcerations, white patches, oral pain, bleeding, dysphagia

Black Box Warning: Local irritation, pain, burning, discoloration at inj site, extravasation

- Symptoms indicating severe allergic reaction: rash, pruritus, urticaria, purpuric skin lesions, itching, flushing

Perform/provide:

- Increased fluid intake to 2-3 L/day to prevent urate deposits, calculi formation
- Brushing of teeth bid-tid with soft brush or cotton-tipped applicator for stomatitis; use unwaxed dental floss

Evaluate:

- Therapeutic response: decreased tumor size, spread of malignancy

Teach patient/family:

- To report any complaints or side effects to nurse or prescriber
- To report any changes in breathing or coughing; to avoid exposure to persons with infection
- That hair may be lost during treatment, that a wig or hairpiece may make patient feel better; that new hair may be different in color, texture
- To report change in gait or numbness in extremities; may indicate neuropathy
- To avoid foods with citric acid, hot or rough texture
- To report any bleeding, white spots, ulcerations in mouth to prescriber; to examine mouth daily
- To wear sunscreen, protective clothing, sunglasses
- To avoid receiving vaccinations

⚠ **Pregnancy:** pregnancy (D); to avoid breastfeeding; that product may cause male infertility

- To notify prescriber if pregnancy is planned or suspected; avoid persons with known infections
- **Infection:** to report sore throat, flulike symptoms

⚠ HIGH ALERT

vinCRIStine (VCR) (Rx)

(vin-kris'teen)

Vincasar PFS

Func. class.: Antineoplastic—miscellaneous

Chem. class.: Vinca alkaloid

Do not confuse:

vinCRIStine/vinBLAStine/vinorelbine

V

ACTION: Inhibits mitotic activity, arrests cell cycle at metaphase; inhibits RNA synthesis, blocks cellular use of glutamic acid needed for purine synthesis; vesicant

USES: Lymphomas, neuroblastoma, Hodgkin's disease, acute lymphoblastic and other leukemias, rhabdomyosarcoma, Wilms' tumor, non-Hodgkin's lymphoma, malignant glioma, soft-tissue sarcoma

Unlabeled uses: Lung, breast, colorectal, head/neck, osteogenic sarcomas; small-cell lung cancer, trophoblastic disease

CONTRAINDICATIONS:

Pregnancy (D), breastfeeding, infants, hypersensitivity, radiation therapy

Black Box Warning: Intrathecal use

Precautions: Renal/hepatic disease, hypertension, neuromuscular disease

Black Box Warning: Extravasation

DOSAGE AND ROUTES

- **Adult: IV** 0.4-1.4 mg/m²/wk, max 2 mg
- **Child: IV** 1-2 mg/m²/wk, max 2 mg

Available forms: Inj 1 mg/ml; powder for inj 5 mg/vial

Administer:

- Antiemetic 30-60 min before product and prn
- Antispasmodic for GI symptoms

Black Box Warning: Do not give intrathecally; fatal

IV route

- After diluting with diluent provided or 1 mg/10 ml sterile water or NaCl; give through Y-tube or 3-way stopcock or directly over 1 min; do not use 5-mg vial for single doses

Black Box Warning: Hyaluronidase 150 units/ml in 1 ml NaCl; apply warm compress for extravasation

Additive compatibilities: Bleomycin, cytarabine, fluorouracil, methotrexate

Syringe compatibilities: Bleomycin, CISplatin, cyclophosphamide, doxapram, DOXOrubicin, droperidol, fluorouracil, heparin, leucovorin, methotrexate, metoclopramide, mitomycin, vinBLAStine

Y-site compatibilities: Allopurinol, amifostine, amphotericin B cholesteryl, aztreonam, bleomycin, CISplatin, cladribine, cyclophosphamide, DOXOrubicin, DOXOrubicin liposome, droperidol, filgrastim, fludarabine, fluorouracil, granisetron, heparin, leucovorin, melphalan, methotrexate, metoclopramide, mitoMYcin, ondansetron, PACLitaxel, piperacillin/tazobactam, sargramostim, teniposide, thiotepa, vinBLAStine, vinorelbine

SIDE EFFECTS

CNS: *Decreased reflexes, numbness, weakness, motor difficulties,* CNS depression, cranial nerve paralysis, seizures, peripheral neuropathy

CV: Orthostatic hypotension

EENT: *Diplopia*

GI: *Nausea, vomiting, anorexia, stomatitis, constipation,* paralytic ileus, *abdominal pain,* hepatotoxicity

GU: Renal tubular obstruction

HEMA: Thrombocytopenia, leukopenia, myelosuppression, anemia

INTEG: *Alopecia,* extravasation

SYST: Tumor lysis syndrome (TLS)

PHARMACOKINETICS

Half-life (triphasic) <5 min, 50-155 min, 23-85 hr; metabolized in liver; excreted in bile, feces; crosses placental, blood-brain barrier

INTERACTIONS

Decrease: immune response—vaccines, toxoids

Decrease: digoxin level—digoxin

Decrease: vinCRIStine effect—CYP3A4 inducers (barbiturates, bosentan, carBAMazepine, efavirenz, phenytoins, nevirapine, rifabutin, rifampin)

Increase: Neurotoxicity: peripheral nervous system products

- Do not use with radiation
- Acute pulmonary reactions: mitoMYcin c

Increase: toxicity—CYP3A4 inhibitors (aprepitant, antiretroviral protease inhibitors, clarithromycin, danazol, delavirdine, diltiazem, erythromycin, fluconazole, FLUoxetine, fluvoxaMINE, imatinib, ketoconazole, mibefradil, nefazodone, telithromycin, voriconazole)

Drug/Herb

- Avoid use with St. John's wort

Drug/Lab Test

Increase: uric acid

Decrease: Hgb, WBC, platelets, sodium

NURSING CONSIDERATIONS

Assess:

- CBC, differential, platelet count before each dose; withhold product if WBC is $<4000/mm^3$ or platelet count is $<75,000/mm^3$; notify prescriber; RBC, Hct, Hgb; may be decreased
- **Bronchospasm:** more common with mitoMYcin
- Hepatic studies before, during therapy (bilirubin, AST, ALT, LDH) as needed or monthly
- Sensitivity of feet/hands, which precedes neuropathy
- **Tumor lysis syndrome:** hyperkalemia, hyperphosphatemia, hyperuricemia, hypocalcemia; more common in leukemia, lymphoma; use alkalinization of urine with allopurinol, monitor electrolytes, renal function (BUN, urine, CCR, uric acid)

Black Box Warning: Extravasation: pain, swelling, poor blood return; if extravasation occurs, local inj of hyaluronidase and moderate heat to area may help disperse product

Intrathecal administration

- **Bleeding:** hematuria, guaiac, bruising, petechiae, mucosa or orifices q8hr
- Effects of alopecia on body image; discuss feelings about body changes
- Buccal cavity q8hr for dryness, sores, ulcerations, white patches, oral pain, bleeding, dysphagia
- Symptoms indicating severe allergic reaction: rash, pruritus, urticaria, purpuric skin lesions, itching, flushing

Perform/provide:

- Brushing of teeth bid-tid with soft brush or cotton-tipped applicator for stomatitis; use unwaxed dental floss

Evaluate:

- Therapeutic response: decreased tumor size, spread of malignancy

Teach patient/family:

- To report change in gait or numbness in extremities; may indicate neuropathy
- To report any bleeding, white spots or ulcerations in mouth to prescriber; to examine mouth daily
- To increase bulk, fluids, exercise to prevent constipation
- **Infection:** to report sore throat, fever, flulike symptoms; avoid persons with known infection
- To avoid vaccinations
- That hair may be lost; that hair will grow back but with different texture, color
- **Pregnancy (D):** to notify prescriber if pregnancy is planned or suspected

To use effective contraception during and for 2 mo after therapy, pregnancy (D), to avoid breastfeeding

⚠ HIGH ALERT

vinorelbine (Rx)

(vi-nor'el-bine)

Navelbine

Func. class.: Antineoplastic—miscellaneous

Chem. class.: Semisynthetic vinca alkaloid

V

ACTION: Inhibits mitotic spindle activity, arrests cell cycle at metaphase; inhibits RNA synthesis, blocks cellular use of glutamic acid needed for purine synthesis; vesicant

USES: Unresectable advanced non–small-cell lung cancer (NSCLC) stage IV;

may be used alone or in combination with CISplatin for stage III or IV NSCLC
Unlabeled uses: Hodgkin's disease, breast/ovarian/head/neck cancer, desmoid tumor

CONTRAINDICATIONS:

Pregnancy (D), breastfeeding, infants, hypersensitivity, granulocyte count <1000 cells/mm^3 pretreatment

Black Box Warning: Severe neutropenia, intrathecal administration

Precautions: Children, geriatric patients, renal/hepatic/pulmonary/neurologic disease, anemia, bone marrow suppression

Black Box Warning: Extravasation

DOSAGE AND ROUTES

- **Adult: IV** 30 mg/m^2/wk
- **ANC 1000-1499:** Give 50% of dose; <1000, hold dose; <1000 × 3 wk, discontinue

Hepatic dose

- **Adult: IV** total bilirubin 2.1-3 mg/dl 15 mg/m^2/wk; total bilirubin ≥3 mg/dl 7.5 mg/m^2/day

Available forms: Inj 10 mg/ml
Administer:

Black Box Warning: Do not give intrathecally; fatal

- Antiemetic 30-60 min before product and prn to prevent vomiting

Intermittent IV INF route

- Dilute to 0.5-2 mg/ml with 0.9% NaCl, 0.45% NaCl, D_5W, D_5/0.45% NaCl, LR, Ringer's sol, give over 6-10 min into Y-site or central line, flush line

Black Box Warning: Hyaluronidase 150 units/ml in 1 ml NaCl, warm compress for extravasation for vesicant activity treatment

Continuous IV INF route

- 40 mg/m^2 q3wk after IV bol of 8 mg/m^2; may be given in combination with DOXOrubicin, fluorouracil, CISplatin

Y-site compatibilities: Amikacin, aztreonam, bleomycin, bumetanide, buprenorphine, butorphanol, calcium gluconate, CARBOplatin, carmustine, cefotaxime, ceftAZidime, ceftizoxime, chlorproMAZINE, cimetidine, CISplatin, clindamycin, cyclophosphamide, cytarabine, dacarbazine, DACTINomycin, DAUNOrubicin, dexamethasone, diphenhydrAMINE, DOXOrubicin, DOXOrubicin liposome, doxycycline, droperidol, enalaprilat, etoposide, famotidine, filgrastim, floxuridine, fluconazole, fludarabine, gallium, gentamicin, granisetron, haloperidol, heparin, hydrocortisone, HYDROmorphone, hydrOXYzine, IDArubicin, ifosfamide, imipenem-cilastatin, LORazepam, mannitol, mechlorethamine, melphalan, meperidine, mesna, methotrexate, metoclopramide, metroNIDAZOLE, minocycline, mitoXANtrone, morphine, nalbuphine, netilmicin, ondansetron, plicamycin, streptozocin, teniposide, ticarcillin, ticarcillin-clavulanate, tobramycin, vancomycin, vinBLAStine, vinCRIStine, zidovudine

SIDE EFFECTS

CNS: Paresthesias, peripheral neuropathy, depression, headache, seizures, weakness, jaw pain, asthenia
CV: Chest pain
GI: *Nausea, vomiting,* ileus, *anorexia, stomatitis,* constipation, abdominal pain, *diarrhea,* hepatotoxicity, GI obstruction/perforation
HEMA: Neutropenia, anemia, thrombocytopenia, granulocytopenia
INTEG: *Rash, alopecia,* photosensitivity, inj site reaction, necrosis
META: SIADH
MS: Myalgia
RESP: SOB, dyspnea, pulmonary edema, acute bronchospasm, acute respiratory distress syndrome (ARDS)

PHARMACOKINETICS

Half-life 27-43 hr; peak 1-2 hr; highly bound to platelets, lymphocytes; metabolized in liver; excreted in feces; small amount unchanged in kidneys

INTERACTIONS

Increase: bleeding risk—NSAIDs, anticoagulants

⚠ Increase: toxicity—CYP3A4 inhibitors (aprepitant, antiretroviral protease inhibitors, clarithromycin, danazol, delavirdine, diltiazem, erythromycin, fluconazole, FLUoxetine, fluvoxaMINE, imatinib, ketoconazole, mibefradil, nefazodone, telithromycin, voriconazole)

Decrease: vinorelbine effect—CYP3A4 inducers (barbiturates, bosentan, carBAMazepine, efavirenz, phenytoins, nevirapine, rifabutin, rifampin)

Drug/Herb

• Avoid use with St. John's wort

Drug/Lab Test

Increase: LFTs, bilirubin

Decrease: Hgb, WBC, platelets

NURSING CONSIDERATIONS

Assess:

• B/P (baseline, q15min) during administration

Black Box Warning: CBC, differential, platelet count before each dose; withhold product if WBC is $<4000/mm^3$ or platelet count is $<75,000/mm^3$; notify prescriber of results; recovery will take 3 wk

• **Bronchospasm:** more common with mitoMYcin; also dyspnea, wheezing; may be treated with oxygen, bronchodilators, corticosteroids, especially if there is underlying pulmonary disease

• Respiratory status: dyspnea, crackles, unproductive cough, chest pain, tachypnea

• Renal studies: BUN, serum uric acid, urine CCr before, during therapy; I&O ratio; report fall in urine output to <30 ml/hr; decreased hyperuricemia

• **Infection,** cold, fever, sore throat; notify prescriber if these occur; effects of alopecia on body image

• **Bleeding:** hematuria, guaiac, bruising, petechiae, mucosa or orifices, no rectal temps; avoid IM inj; apply pressure to venipuncture sites

• Hepatic function tests: AST, ALT, bilirubin, LDH

⚠ Severe allergic reactions: rash, pruritus, urticaria, itching, flushing, bronchospasm, hypotension; EPINEPHrine and crash cart should be nearby

• Neurologic status: numbness, pain, tingling, loss of Achilles reflex, weakness, palsies

Perform/provide:

• Brushing of teeth bid-tid with soft brush or cotton-tipped applicator for stomatitis; unwaxed dental floss

Evaluate:

• Therapeutic response: decreased tumor size, spread of malignancy

Teach patient/family:

• To report change in gait or numbness in extremities, continuing constipation; may indicate neurotoxicity

• To examine mouth daily for bleeding, white spots, ulcerations; to notify prescriber

• **Infection:** report sore throat, fever, flu-like symptoms

• To avoid crowds, people with infections, vaccinations, OTC products

⚠ Pregnancy: notify prescriber if pregnancy is planned or suspected; to use effective contraception during treatment and for ≥2 mo after product is discontinued, pregnancy (D); to avoid breastfeeding

• That hair may be lost; that hair will grow back but with different texture, color

vitamin A (Rx, PO-OTC, Rx-IM)

Aquasol A, Vitamin A

Func. class.: Vitamin, fat soluble

Chem. class.: Retinol

V

ACTION: Needed for normal bone, tooth development; visual dark adaptation; skin disease; mucosa tissue repair; assists with production of adrenal steroids, cholesterol, RNA

USES: Vit A deficiency

CONTRAINDICATIONS:

Pregnancy (X) (IM), hypersensitivity to vit A, malabsorption syndrome, hypervitaminosis A, IV administration

Precautions: Pregnancy (C) (PO), breastfeeding, impaired renal function, children, hepatic disease, infants, alcoholism, hepatitis

DOSAGE AND ROUTES

• **Adult and child >8 yr: PO** 100,000-500,000 international units/day × 3 days then 50,000/day × 2 wk; dose based on severity of deficiency; maintenance 10,000-20,000 international units for 2 mo

• **Child 1-8 yr: IM** 5000-15,000 international units/day × 10 days

• **Infant <1 yr: IM** 5000-15,000 international units × 10 days

Maintenance

• **Child 4-8 yr: IM** 15,000 international units/day × 2 mo

• **Child <4 yr: IM** 10,000 international units/day × 2 mo

Available forms: Caps 10,000, 25,000, 50,000 international units; drops 5000 international units; inj 50,000 international units/ml; tabs 10,000, 25,000, 50,000 international units

Administer:

PO route

• With food (PO) for better absorption

• Do not administer IV because of risk of anaphylactic shock; IM only

• Oral preparations not indicated for vit A deficiency in those with malabsorption syndrome

IM route

• Give deep in large muscle mass; do not use deltoid muscle for administration of >1 ml

SIDE EFFECTS

CNS: Headache, increased intracranial pressure, intracranial hypertension, lethargy, malaise

EENT: Gingivitis, papilledema, exophthalmos, inflammation of tongue and lips

GI: Nausea, vomiting, anorexia, abdominal pain, jaundice

INTEG: Drying of skin, pruritus, increased pigmentation, night sweats, alopecia

META: Hypomenorrhea, hypercalcemia

MS: Arthralgia, retarded growth, hard areas on bone

PHARMACOKINETICS

Stored in liver, kidneys, fat; excreted (metabolites) in urine, feces

INTERACTIONS

Increase: levels of vit A—corticosteroids, oral contraceptives

Decrease: absorption of vit A—mineral oil, cholestyramine, colestipol

Drug/Lab Test

False increase: bilirubin, serum cholesterol

NURSING CONSIDERATIONS

Assess:

• Nutritional status: yellow and dark green vegetables, yellow/orange fruits, vit-A–fortified foods, liver, egg yolks

• **Vit A deficiency:** decreased growth; night blindness; dry, brittle nails; hair loss; urinary stones; increased infection; hyperkeratosis of skin; drying of cornea

Perform/provide:

• Storage in tight, light-resistant container

Evaluate:

• Therapeutic response: increased growth rate, weight; absence of dry skin and mucous membranes, night blindness

Teach patient/family:

• That, if dose is missed, it should be omitted

• That ophthalmic exams may be required periodically throughout therapy

• Not to use mineral oil while taking this product

• To notify prescriber of nausea, vomiting, lip cracking, loss of hair, headache

• Not to take more than prescribed amount

TREATMENT OF OVERDOSE:

Discontinue product

vitamin E (OTC)

Aquasol E

Func. class.: Vit E

Chem. class.: Fat soluble

ACTION: Needed for digestion and metabolism of polyunsaturated fats; decreases platelet aggregation, blood clot formation; promotes normal growth and development of muscle tissue, prostaglandin synthesis

USES: Vit E deficiency, impaired fat absorption, hemolytic anemia in premature neonates, prevention of retrolental fibroplasia, sickle cell anemia, supplement for malabsorption syndrome

CONTRAINDICATIONS: IV use in infants

Precautions: Pregnancy (A), anemia, breastfeeding, hypoprothrombinemia

DOSAGE AND ROUTES

Deficiency

- **Adult: PO** 60-75 international units/day
- **Child: PO** 1 international units/kg (malabsorption)

Prevention of deficiency

- **Adult: PO** 30 international units/day; **TOP** apply to affected areas
- **Infant: PO** 5 international units/day

Available forms: Caps 100, 200, 400, 500, 600, 1000 international units; tabs 100, 200, 400 international units; drops 50 mg/ml; chew tabs 400 units; ointment; cream; lotion; oil

Administer:

PO route

- Administer with or after meals
- Chew chewable tabs well
- Sol may be dropped in mouth or mixed with food

Topical route

- To moisturize dry skin

SIDE EFFECTS

CNS: Headache, fatigue
CV: Increased risk for thrombophlebitis
EENT: Blurred vision
GI: Nausea, cramps, diarrhea
GU: Gonadal dysfunction
INTEG: Sterile abscess, contact dermatitis
META: Altered metabolism of hormones (thyroid, pituitary, adrenal), altered immunity
MS: Weakness

PHARMACOKINETICS

PO: Metabolized in liver, excreted in bile

INTERACTIONS

Increase: action of oral anticoagulants
Decrease: absorption—cholestyramine, colestipol, mineral oil, sucralfate

NURSING CONSIDERATIONS

Assess:

- Nutritional status: wheat germ; dark green, leafy vegetables; nuts; eggs; liver; vegetable oils; dairy products; cereals

Perform/provide:

- Storage in tight, light-resistant container

Evaluate:

- Therapeutic response: absence of hemolytic anemia, adequate vit E levels, improvement in skin lesions, decreased edema

Teach patient/family:

- About the necessary foods for diet
- To omit dose if missed
- To avoid vitamin supplements unless directed by prescriber

voriconazole (Rx)

(vohr-i-kahn'a-zol)

Vfend

Func. class.: Antifungal, systemic

Chem. class.: Triazole derivative

V

ACTION: Inhibits fungal CYP 450-mediation demethylation; needed for bio-

synthesis; causes leakage from cell membrane

USES: Invasive aspergillosis, serious fungal infections (*Candida* sp., *Scedosporium apiospermum, Fusarium* sp., *Monosporium, Apiospermum*)
Unlabeled uses: *Acremonium sp., Blastomyces dermatitidis, Coccidioides immitis, Cryptococcus neoformans,* febrile neutropenia, fungal keratitis, *Histoplasma capsulatum,* oropharyngeal candidiasis, *Rhodotorula sp., Scedosporium sp.,* cutaneous aspergillosis, candidemia (premature neonates), fungal infections in children ≥12 yr

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, children, hypersensitivity, severe bone marrow depression, severe hepatic disease
Precautions: Renal disease (IV); patients of Asian/African descent; cardiomyopathy, cholestasis, chemotherapy, lactase deficiency, visual disturbances, renal failure, pancreatitis, QT prolongation, hypokalemia; ventricular dysrhythmias, torsades de pointes

DOSAGE AND ROUTES

Esophageal candidiasis
• **Adult/geriatric/child ≥12 yr and ≥40 kg: PO** 200 mg q12hr; **<40 kg**, 100 mg q12hr
• **Adult/geriatric/child ≥12 yr: IV INF** Loading dose 6 mg/kg q12hr × 2 dose then 4 mg/kg q12hr; may switch to oral dosing
Candidemia of the skin, kidney, bladder wall, abdomen (nonneutropenic patients)
• **Adult/child ≥12 yr: IV** loading dose 6 mg/kg q12hr × 24 hr then 3-4 mg/kg q12hr × ≥14 days and ≥7 days after resolution of symptoms; **PO** after loading dose **>40 kg** 200 mg q12hr × ≥14 days and ≥7 days after resolution of symptoms; **<40 kg** 100 mg q12hr × ≥14 days and ≥7 days after resolution of symptoms
Invasive aspergillosis
• **Adults/adolescents: IV** 6 mg/kg q12hr (loading dose) then 4 mg/kg q12hr, may reduce to 3 mg/kg q12hr if intolerable
• **Child ≥12 yr: IV** 6 mg/kg q12hr, then 4 mg/kg q12hr
CNS blastomycosis/blastomycosis meningitis (unlabeled)
• **Adult: PO** 200-400 mg bid × at least 12 mo and until resolution of CSF abnormalities
Renal dose
• **Adult: PO** CCr <50 ml/min, use orally only
Hepatic dose
• **Adult: PO** 6 mg/kg q12hr × 2 doses then 2 mg/kg q12hr or 100 mg q12hr if >40 kg; 50 mg q12hr if <40 kg
Available forms: Tabs 50, 200 mg; powder for inj, lyophilized 200 mg voriconazole, powder for oral susp 45 g (40 mg/ml after reconstitution)
Administer:
PO route
• Oral susp: tap bottle; add 46 ml of water to bottle; shake well; remove cap; push bottle adaptor into neck of bottle; replace cap; write expiration date (14 days); shake well before each use; administer using only oral dispenser supplied, 1 hr before or after meals; tabs and susp may be interchanged
Intermittent IV INF route
• Product only after C&S confirms organism, product needed to treat condition; make sure product used in life-threatening infections
• Reconstitute powder with 19 ml water for inj to 10 mg/ml, shake until dissolved; infuse over 1-2 hr at conc of ≤5 mg/ml; do not admix with other products, 4.2% sodium bicarbonate inf
• Store at room temp (powder, tabs)
Y-site compatibilities: Acyclovir, alfentanil, allopurinol, amifostine, amikacin, aminocaproic acid, aminophylline, amiodarone, amphotericin B liposome, ampicillin, ampicillin/sulbactam, anidulafungin, azithromycin, aztreonam, bivalirudin, bleomycin, bumetanide, bu-

prenorphine, butorphanol, calcium acetate/chloride/gluconate, CARBOplatin, carmustine, caspofungin, ceFAZolin, cefotaxime, cefoTEtan, cefOXitin, ceftAZidime, ceftizoxime, ceftRIAXone, chloramphenicol, chlorproMAZINE, cimetidine, ciprofloxacin, cisatracurium, CISplatin, clindamycin, cyclophosphamide, cytarabine, dacarbazine, DACTINomycin, DAPTOmycin, DAUNOrubicin, dexamethasone, dexmedetomidine, dexrazoxane, digoxin, diltiazem, diphenhydrAMINE, DOBUTamine, DOCEtaxel, dolasetron, DOPamine, doripenem, doxacurium, doxycycline, droperidol, enalaprilat, ePHEDrine, EPINEPHrine, epirubicin, ertapenem, erythromycin, esmolol, etoposide, etoposide phosphate, famotidine, fenoldopam, fentaNYL, fluconazole, fludarabine, fluorouracil, foscarnet, fosphenytoin, furosemide, ganciclovir, gemcitabine, gentamicin, glycopyrrolate, granisetron, haloperidol, heparin, hydrALAZINE, hydrocortisone, ifosfamide, imipenem/cilastatin, inamrinone, insulin, irinotecan, isoproterenol, ketorolac, labetalol, leucovorin, levofloxacin, lidocaine, linezolid, LORazepam, magnesium sulfate, mannitol, mechlorethamine, melphalan, meperidine, meropenem, mesna, metaraminol, methohexital, methotrexate, methyldopate, methylPREDNISolone, metoclopramide, metoprolol, metroNIDAZOLE, midazolam, milrinone, mitoMYcin, morphine, nafcillin, nalbuphine, naloxone, niCARdipine, nitroglycerin, norepinephrine, octreotide, ondansetron, oxaliplatin, oxytocin, PACLitaxel, pamidronate, pancuronium, pentamidine, pentazocine, PENTobarbital, PHENobarbital, phentolamine, phenylephrine, piperacillin/tazobactam, potassium chloride/phosphates, procainamide, promethazine, propranolol, quinupristin/dalfopristin, remifentanil, rocuronium, sodium acetate/bicarbonate/phosphates, streptozocin, succinylcholine, SUFentanil, tacrolimus, teniposide, theophylline, thiotepa, ticarcillin/clavulanate, tirofiban, tobramycin, topotecan, trimethobenzamide, trimethoprim/sulfamethoxazole, vancomycin, vasopressin, vecuronium, verapamil, vinBLAStine, vinCRIStine, vinorelbine, zidovudine

SIDE EFFECTS

CNS: *Headache,* paresthesias, peripheral neuropathy, hallucinations, psychosis, EPS, depression, Guillain-Barré syndrome, insomnia, suicidal ideation, dizziness

CV: Tachycardia, hypo/hypertension, vasodilation, atrial arrhythmias, atrial fibrillation, AV block, bradycardia, CHF, MI, QT prolongation, torsades de pointes

EENT: Blurred vision, eye hemorrhage

GI: *Nausea, vomiting, anorexia,* diarrhea, cramps, hemorrhagic gastroenteritis, acute hepatic failure, hepatitis, intestinal perforation, pancreatitis

GU: *Hypokalemia,* azotemia, renal tubular necrosis, permanent renal impairment, anuria, oliguria

HEMA: Anemia, eosinophilia, hypomagnesemia, thrombocytopenia, leukopenia, pancytopenia

INTEG: *Burning, irritation,* pain, necrosis at inj site with extravasation, dermatitis, rash, photosensitivity

MISC: Respiratory disorder

SYST: Stevens-Johnson syndrome, toxic epidermal necrolysis, sepsis; melanoma (photosensitivity reactions)

PHARMACOKINETICS

By CYP3A4, CYP2C9 enzymes; max serum conc 1-2 hr after dosing; eliminated via hepatic metabolism; protein binding 58%; elimination half-life 6 hr (dose dependent)

INTERACTIONS

Increase: effects of benzodiazepines, calcium channel blockers, cycloSPORINE, ergots, HMG-CoA reductase inhibitors, pimozide, quiNIDine, prednisoLONE, sirolimus, sulfonylureas, tacrolimus, vinca alkaloids, warfarin, rifabutin, proton pump inhibitors, NNRTIs, protease inhibitors, phenytoin

V

Increase: nephrotoxicity—other nephrotoxic antibiotics (aminoglycosides, CISplatin, vancomycin, cycloSPORINE, polymyxin B)
Increase: hypokalemia—corticosteroids, digoxin, skeletal muscle relaxants, thiazides
Increase: QT prolongation—class IA/III antidysrhythmics, some phenothiazines, β agonists, local anesthetics, tricyclics, haloperidol, chloroquine, droperidol, pentamidine; CYP3A4 inhibitors (amiodarone, clarithromycin, erythromycin, telithromycin, troleandomycin), arsenic trioxide, levomethadyl; CYP3A4 substrates (methadone, pimozide, QUEtiapine, quiNIDine, risperiDONE, ziprasidone)

Drug/Herb
- Do not use with St. John's wort

Drug/Food
- Avoid use with high-fat meals, take 1 hr before or after meal

Drug/Lab Test
Increase: AST/ALT, alk phos, creatinine, bilirubin
Decrease: Hgb/Hct, platelets, WBC

NURSING CONSIDERATIONS

Assess:
- VS q15-30min during first inf; note changes in pulse, B/P
- I&O ratio; watch for decreasing urinary output, change in specific gravity; discontinue product to prevent permanent damage to renal tubules
- Blood studies: CBC, K, Na, Ca, Mg q2wk; BUN, creatinine weekly
- Weight weekly; if weight increases >2 lb/wk, edema is present; renal damage should be considered

Renal toxicity: increasing BUN, serum creatinine; if BUN is >40 mg/dl or if serum creatinine >3 mg/dl, product may be discontinued or dosage reduced
Hepatotoxicity: increasing AST, ALT, alk phos, bilirubin, baseline and periodically
- **Allergic reaction:** dermatitis, rash; product should be discontinued, antihistamines (mild reaction) or epinephrine (severe reaction) administered
- **Hypokalemia:** anorexia, drowsiness, weakness, decreased reflexes, dizziness, increased urinary output, increased thirst, paresthesias
- **Ototoxicity:** tinnitus (ringing, roaring in ears), vertigo, loss of hearing (rare); visual disturbance
- **QT prolongation:** ECG, ejection fraction; assess for chest pain, palpitations, dyspnea

Evaluate:
- Therapeutic response: decreased fever, malaise, rash, negative C&S for infecting organism

Teach patient/family:
- That long-term therapy may be needed to clear infection (2 wk-3 mo, depending on type of infection)
- To notify prescriber of bleeding, bruising, soft-tissue swelling, dark urine, persistent nausea or diarrhea, headache, rash, yellow skin/eyes
- Take 1 hr before or after meal (PO)
- Do not drive at night because of vision changes
- Avoid strong, direct sunlight
- Women of childbearing age should use effective contraceptive, pregnancy (D)

HIGH ALERT

warfarin (Rx)

(war'far-in)

Coumadin, Jantoven

Func. class.: Anticoagulant

Chem. class.: Coumarin derivative

Do not confuse:
Coumadin/Cardura/Compazine

ACTION: Interferes with blood clotting by indirect means; depresses hepatic synthesis of vit-K–dependent coagulation factors (II, VII, IX, X)

USES: Antiphospholipid antibody syndrome, arterial thromboembolism prophylaxis, DVT, MI prophylaxis, after MI,

stroke prophylaxis, thrombosis prophylaxis
Unlabeled uses: Angina, unstable angina

CONTRAINDICATIONS:

Pregnancy (X), breastfeeding, hypersensitivity, hemophilia, leukemia with bleeding, peptic ulcer disease, thrombocytopenic purpura, hepatic disease (severe), malignant hypertension, subacute bacterial endocarditis, acute nephritis, blood dyscrasias, eclampsia, preeclampsia, hemorrhagic tendencies; surgery of CNS, eye; traumatic surgery with large open surface, bleeding tendencies of GI/GU/respiratory tract, stroke, aneurysms, pericardial effusion, spinal puncture, major regional/lumbar block anesthesia

Black Box Warning: Bleeding

Precautions: Geriatric patients, alcoholism, CHF, debilitated patients, trauma, indwelling catheters, severe hypertension, active infections, protein C deficiency, polycythemia vera, vasculitis, severe diabetes, Asian patients (CYP2C9), protein C, S deficiency

DOSAGE AND ROUTES

- **Adult: PO/IV** 2.5-10 mg/day × 2-4 days then titrated to INR/PT
- **Adolescent/child/infant: PO/IV** 0.2 mg/kg/day × 2 days titrated to INR

Available forms: Tabs 1, 2, 2.5, 3, 4, 5, 6, 7.5, 10 mg; inj 5 mg powder for inj
Administer:
PO route
- At same time each day to maintain steady blood levels without regard to food; food decreases rate but not extent of absorption; do not change brands
- Tabs whole or crushed
- Avoiding all IM inj that may cause bleeding

Direct IV route
- Reconstitute with 2.7 ml sterile water for inj (2 mg/ml); do not use sol that is discolored or that has particulates
- Give over 1-2 min into peripheral vein

Y-site compatibilities: Amikacin, ascorbic acid, bivalirudin, ceFAZolin, cefTRIAXone, DOPamine, EPINEPHrine, heparin, lidocaine, metaraminol, morphine, nitroglycerin, oxytocin, potassium chloride, ranitidine

SIDE EFFECTS

CNS: *Fever,* dizziness, fatigue, headache, lethargy
CV: Angina, chest pain, edema, hypotension, syncope
GI: *Diarrhea,* nausea, vomiting, anorexia, stomatitis, cramps, hepatitis, cholestatic jaundice
GU: Hematuria
HEMA: Hemorrhage, agranulocytosis, leukopenia, eosinophilia, anemia, ecchymosis, petechiae
INTEG: *Rash,* dermatitis, urticaria, alopecia, pruritus
MISC: Epistaxis, hemoptysis, mouth ulcers, taste disturbances, priapism, dyspnea
MS: Bone fractures
SYST: Anaphylaxis, coma, cholesterol, microembolism, exfoliative dermatitis, purple toe syndrome

PHARMACOKINETICS

PO: Onset 12-24 hr, peak 1½-4 days, duration 3-5 days, effective half-life 20-60 hr; metabolized in liver; excreted in urine, feces (active/inactive metabolites); crosses placenta, 99% bound to plasma proteins

INTERACTIONS

Increase: warfarin action—allopurinol, amiodarone, chloral hydrate, chloramphenicol, cimetidine, clofibrate, cotrimoxazole, COX-2 selective inhibitors, dextrothyroxine, diflunisal, disulfiram, erythromycin, ethacrynic acids, furosemide, glucagon, heparin, HMG-CoA reductase inhibitors, indomethacin, isoniazid, mefenamic acid, metroNIDAZOLE, mifepristone, NSAIDs, oxyphenbutazones, penicillins, phenylbutazone, quiNIDine, quinolone antiinfectives, RU-486,

salicylates, sulfinpyrazone, sulfonamides, sulindac, SSRIs, steroids, thrombolytics, thyroid, tricyclics
Increase: toxicity—oral sulfonylureas, phenytoin
Decrease: warfarin action—aprepitant, azaTHIOprine, barbiturates, bile acid sequestrants, bosentan, carBAMazepine, dicloxacillin, estrogens, ethchlorvynol, factor IX/VIIa, griseofulvin, nafcillin, oral contraceptives, phenytoin, rifampin, sucralfate, sulfaSALAzine, thyroid, vit K, vit K foods
Drug/Herb
Increase: risk for bleeding—angelica, anise, basil, chamomile, chondroitin, dong quai, evening primrose, feverfew, garlic, ginger, ginkgo, ginseng, horse chestnut, kava, licorice, melatonin, red yeast rice, saw palmetto
Decrease: anticoagulant effect—coenzyme Q10, St. John's wort
Drug/Lab Test
Increase: T_3 uptake, LFTs
Decrease: uric acid

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Blood studies (Hct, PT, platelets, occult blood in stools) q3mo; INR: in hospital daily after 2nd or 3rd dose; when in therapeutic range for 2 consecutive days, monitor 2-3× wk for 1-2 wk then less frequently, depending on stability of INR results; *Outpatient:* monitor every few days until stable dose then periodically thereafter, depending on stability of INR results, usually at least monthly

Black Box Warning: Bleeding gums, petechiae, ecchymosis, black tarry stools, hematuria; fatal hemorrhage can occur

⚠ Fever, skin rash, urticaria

Perform/provide:
• Storage in tight container
Evaluate:
• Therapeutic response: decrease in deep venous thrombosis
Teach patient/family:
• To avoid OTC preparations that may cause serious product interactions unless directed by prescriber
• To carry emergency ID identifying product taken
• About the importance of compliance
• To report any signs of bleeding: gums, under skin, urine, stools; to use soft-bristle toothbrush to avoid bleeding gums; to use electric razor
• To avoid hazardous activities (eg, football, hockey, skiing), dangerous work
• About the importance of avoiding unusual changes in vitamin intake, diet, or lifestyle
• To inform all health care providers of anticoagulant intake

TREATMENT OF OVERDOSE:

Administer vit K

xylometazoline nasal agent

See Appendix B

zafirlukast (Rx)

(za-feer'loo-cast)
Accolate
Func. class.: Bronchodilator
Chem. class.: Leukotriene receptor antagonist

ACTION: Antagonizes the contractile action of leukotrienes (LTD_4, LTE_4) in airway smooth muscle; inhibits bronchoconstriction caused by antigens

USES: Prophylaxis and chronic treatment of asthma in adults/children >5 yr
Unlabeled uses: Allergic rhinitis

CONTRAINDICATIONS: Hypersensitivity, hepatic encephalopathy
Precautions: Pregnancy (B), breastfeeding, children, geriatric patients, hepatic disease, Churg-Strauss syndrome, acute bronchospasm

DOSAGE AND ROUTES

- **Adult and child ≥12 yr: PO** 20 mg bid
- **Child 5-11 yr: PO** 10 mg bid

Available forms: Tabs 10, 20 mg

Administer:

- 1 hr before or 2 hr after meals; absorption may be decreased if given with food

SIDE EFFECTS

CNS: Headache, dizziness, suicidal ideation, insomnia, fever

GI: Nausea, diarrhea, abdominal pain, vomiting, dyspepsia, hepatic failure, hepatitis

HEMA: Agranulocytosis

OTHER: Infections, pain, asthenia, myalgia, fever, increased ALT, urticaria, rash, angioedema

PHARMACOKINETICS

Rapidly absorbed, peak 3 hr, 99% protein binding (albumin), extensively metabolized, inhibits CYP2C9 and 3A4 enzyme systems, excreted in feces, clearance reduced in geriatric patients, hepatic impairment, half-life 10 hr

INTERACTIONS

Increase: plasma levels of zafirlukast—aspirin

Increase: PT—warfarin

Decrease: plasma levels of zafirlukast—erythromycin, theophylline

Drug/Food

Decrease: bioavailability

NURSING CONSIDERATIONS

Assess:

- **Adult patients carefully for symptoms of Churg-Strauss syndrome** (rare), including eosinophilia, vasculitic rash, worsening pulmonary symptoms, cardiac complications, neuropathy, may be caused by reducing oral corticosteroids
- Respiratory rate, rhythm, depth; auscultate lung fields bilaterally; notify prescriber of abnormalities, not to be used for acute bronchospasm in acute asthma
- **Hepatic disease:** monitor liver function tests

Evaluate:

- Therapeutic response: ability to breathe more easily

Teach patient/family:

- To check OTC medications, current prescription medications that may increase stimulation
- To avoid hazardous activities because dizziness may occur
- That, if GI upset occurs, to take product with 8 oz water; to avoid taking with food if possible because absorption may be decreased
- To notify prescriber of nausea, vomiting, diarrhea, abdominal pain, fatigue, jaundice, anorexia, flulike symptoms (hepatic dysfunction)
- Not to use for acute asthma episodes
- Not to take if breastfeeding
- To take even if symptom free

zaleplon (Rx)

(zal'eh-plon)

Sonata

Func. class.: Hypnotic, nonbarbiturate

Chem. class.: Pyrazolopyrimidine

Controlled Substance Schedule IV

ACTION: Binds selectively to omega-1 receptor of the $GABA_A$ receptor complex; results are sedation, hypnosis, skeletal muscle relaxation, anticonvulsant activity, anxiolytic action

USES: Insomnia (short-term treatment)

CONTRAINDICATIONS: Hypersensitivity, severe hepatic disease

Precautions: Pregnancy (C), breastfeeding, children <15 yr, geriatric patients, respiratory/renal/hepatic disease, psychosis, angioedema, depression, sleep-related behaviors (sleep walking)

Z

DOSAGE AND ROUTES

• **Adult: PO** 10 mg at bedtime; may increase dose to 20 mg at bedtime if needed; 5 mg may be used in low-weight persons
• **Geriatric: PO** 5 mg at bedtime; may increase if needed
Available forms: Caps 5, 10 mg
Administer:
• Immediately before bedtime for sleeplessness
• On empty stomach for fast onset

SIDE EFFECTS

CNS: *Lethargy, drowsiness, daytime sedation,* dizziness, confusion, anxiety, amnesia, depersonalization, hallucinations, hyperesthesia, paresthesia, somnolence, tremor, vertigo, complex sleep related reactions: sleep driving, sleep eating
CV: Chest pain, peripheral edema
EENT: Vision change, ear/eye pain, hyperacusis, parosmia
GI: Nausea, abdominal pain, constipation, anorexia, colitis, dyspepsia, dry mouth
MISC: Asthenia, fever, headache, myalgia, dysmenorrhea
MS: Myalgia, back pain, arthritis
RESP: Bronchitis
SYST: Severe allergic reactions

PHARMACOKINETICS

Rapid onset, metabolized by liver extensively, excreted by kidneys (inactive metabolites), half-life 1 hr, onset, peak 1 hr, duration 3-4 hr

INTERACTIONS

Increase: effect of zaleplon—cimetidine
Decrease: zaleplon bioavailability—CYP3A4 inducers
Drug/Food
• Prolonged absorption, sleep onset reduced: high-fat/heavy meal

NURSING CONSIDERATIONS

Assess:
• Mental status: mood, sensorium, affect, memory (long, short term), excessive sedation, impaired coordination
• **Sleep disorder:** type of sleep problem: falling asleep, staying asleep; monitor for complex sleep disorders
Perform/provide:
• Storage in tight container in cool environment
Evaluate:
• Therapeutic response: ability to sleep at night, decreased amount of early morning awakening
Teach patient/family:
• To avoid driving or other activities requiring alertness until product is stabilized
• To avoid alcohol ingestion
• That product may cause memory problems, dependence (if used for longer periods of time), changes in behavior/thinking, complex sleep-related behaviors (sleep eating/driving)
• That product is for short-term use only
• To take immediately before going to bed
• Not to ingest a high-fat/heavy meal before taking

zanamivir (Rx)

(zan'ah-mih-veer)
Relenza
Func. class.: Antiviral
Chem. class.: Neuramidase inhibitor

ACTION: Inhibits neuramidase enzyme needed for influenza virus replication

USES: Treatment of influenza types A and B for patients who have been symptomatic for ≤2 days
Unlabeled uses: Prophylaxis against influenza; swine flu (H1N1)

CONTRAINDICATIONS:
Hypersensitivity

Precautions: Pregnancy (C), breastfeeding, children <7 yr, geriatric patients, respiratory disease, angioedema, milk protein hypersensitivity, Reye's syndrome

DOSAGE AND ROUTES

• **Adult/child >7 yr: INH** 2 inhalations (two 5-mg blisters) q12hr × 5 days; on the 1st day, 2 doses should be taken with at least 2 hr between doses

H1N1 (swine flu) (unlabeled)

• **Adult/adolescent/child ≥7 yr: INH** 2 bid × 5 days

Available forms: Blisters of powder for inhalation: 5 mg

Administer:

• Within 2 days of symptoms of influenza; continue for 5 days

• Give patient "Patient's Instructions for Use," review all points before using delivery system

• Do not use as nebulized sol or in mechanical ventilation

SIDE EFFECTS

CNS: *Headache, dizziness,* **seizures,** fatigue; self-injury, delirium (child)
EENT: Ear, nose, throat infections
GI: *Nausea, vomiting,* diarrhea
RESP: Nasal symptoms, cough, sinusitis, bronchitis, **bronchospasm**
SYST: **Angioedema**

PHARMACOKINETICS

Half-life 2½-5 hr, not metabolized, excreted in urine unchanged

INTERACTIONS

• May decrease intranasal influenzae vaccine; separate by ≥48 hr, do not restart antiviral products for ≥2 wk

NURSING CONSIDERATIONS

Assess:

• Skin eruptions, photosensitivity after administration of product

• Respiratory status: rate, character, wheezing, tightness in chest

• Allergies before initiation of treatment, reaction of each medication

• Signs of infection

Perform/provide:

• Storage in tight, dry container

Evaluate:

• Therapeutic response: absence of fever, malaise, cough, dyspnea with infection

Teach patient/family:

• That product does not reduce transmission risk of influenza to others

• That patients with asthma or COPD should carry a fast-acting inhaled bronchodilator because bronchospasm may occur; to use scheduled inhaled bronchodilators before using product

• To avoid hazardous activities if dizziness occurs

zidovudine (Rx)

(zye-doe'-vue-deen)

Novo-AZT ✤, Retrovir

Func. class.: Antiretroviral

Chem. class.: Nucleoside reverse transcriptase inhibitor (NRTI)

Do not confuse:
Retrovir/ritonavir

ACTION:
Inhibits replication of HIV-1 virus by incorporating into cellular DNA by viral reverse transcriptase, thereby terminating the cellular DNA chain

USES:
Used in combination with at least 2 other antiretrovirals for HIV-1 infection

Unlabeled uses: Epstein-Barr virus, hepatitis B, human T-lymphotropic virus type I (HTLV-I), thrombocytopenia

CONTRAINDICATIONS:
Hypersensitivity

Precautions: Pregnancy (C), breastfeeding, children, granulocyte count <1000/mm³ or Hgb <9.5 g/dl, severe renal disease, obesity

Black Box Warning: Impaired hepatic function, anemia, lactic acidosis, myopathy, neutropenia

DOSAGE AND ROUTES

HIV infections with other antiretrovirals

- **Adult: PO (tabs, caps, syrup)** 600 mg/day in divided doses, either 200 mg tid or 300 mg bid in combination with other antiretrovirals; **IV** 1 mg/kg q4hr, initiate **PO** as soon as possible up to 1000 mg
- **Child 25 kg to <30 kg: PO (tabs/caps)** 500 mg/day divided bid
- **Child 19 kg to <25 kg: PO (tabs/caps)** 400 mg/day divided bid
- **Infant/child ≥4 wk and 13 to <19 kg: PO (tabs/caps)** 300 mg/day divided bid
- **Infant/child ≥4 wk and 7 to <13 kg: PO (tabs/caps)** 200 mg/day divided bid
- **Infant/child ≥4 wk and 5 to <7 kg: PO (tabs/caps)** 150 mg/day divided bid
- **Adolescent/child ≥30 kg: PO (tabs/caps/syrup)** 300 mg bid or 200 mg tid
- **Infant ≥4 wk, child/adolescent ≥9 to <30 kg: PO (syrup)** 18 mg/kg/day divided bid or tid
- **Infant ≥4 wk and 4 to <9 kg: PO (syrup)** 24 mg/kg/day divided bid or tid
- **Neonate (unlabeled): PO (syrup)** 2 mg/kg q6hr
- **Premature neonate (unlabeled): PO (syrup)** 2 mg/kg q12hr, increase to 2 mg/kg q8hr at 2 wk for neonates ≥30 wk gestation or at 4 wk for neonates <30 wk gestation

Prevention of maternal–fetal HIV transmission

- **Neonates ≥34 wk: PO** 2 mg/kg/dose q6hr × 6 wk beginning 8-12 hr after birth; **IV** 1.5 mg/kg/dose over 30 min q6hr until able to take **PO**
- **Maternal (>14 wk gestation): PO** 100 mg 5×/day until start of labor then during labor/delivery **IV** 2 mg/kg over 1 hr followed by **IV INF** 1 mg/kg/hr until umbilical cord clamped

Prevention of HIV after needlestick

- **Adult: PO** 200 mg tid plus lamiVUDine 150 mg bid plus a protease inhibitor for high-risk exposure; begin within 2 hr of exposure

Available forms: Caps 100; tabs 300 mg; inj 10 mg/ml; oral syr 50 mg/5 ml

Administer:

- By mouth; capsules should be swallowed whole
- Trimethoprim-sulfamethoxazole, pyrimethamine, or acyclovir as ordered to prevent opportunistic infections; if these products are given, watch for neurotoxicity

Intermittent IV INF route

- After diluting each 1 mg/0.25 ml or more D_5W to ≤4 mg/ml; give over 1 hr
- Protect unopened product from light, use diluted sol within 24 hr room temperature, 48 hr refrigerated

Y-site compatibilities: Acyclovir, allopurinol, amifostine, amikacin, amphotericin B, amphotericin B cholesteryl, aztreonam, cefepime, cefTAZidime, cefTRIAXone, cimetidine, cisatracurium, clindamycin, dexamethasone, DOBUTamine, DOPamine, DOXOrubicin liposome, erythromycin, filgrastim, fluconazole, fludarabine, gentamicin, granisetron, heparin, imipenem-cilastatin, LORazepam, melphalan, metoclopramide, morphine, nafcillin, ondansetron, oxacillin, PACLitaxel, pentamidine, phenylephrine, piperacillin, piperacillin-tazobactam, potassium chloride, ranitidine, remifentanil, sargramostim, teniposide, thiotepa, tobramycin, trimethoprim-sulfamethoxazole, trimetrexate, vancomycin, vinorelbine

SIDE EFFECTS

CNS: *Fever, headache, malaise,* diaphoresis, *dizziness, insomnia,* paresthesia, somnolence, chills, tremor, twitching, anxiety, confusion, depression, lability, vertigo, loss of mental acuity, seizures, malaise

EENT: Taste change, hearing loss, photophobia

GI: *Nausea, vomiting, diarrhea, anorexia,* cramps, *dyspepsia, constipation,* dysphagia, *flatulence,* rectal bleeding, mouth ulcer, abdominal pain, hepatomegaly
GU: Dysuria, polyuria, urinary frequency, hesitancy
HEMA: Granulocytopenia, anemia
INTEG: *Rash,* acne, pruritus, urticaria
MS: Myalgia, arthralgia, muscle spasm
RESP: Dyspnea
SYST: Lactic acidosis

PHARMACOKINETICS

PO: Rapidly absorbed from GI tract, peak $^1/_2$-$1^1/_2$ hr, metabolized in liver (inactive metabolites), excreted by kidneys, protein binding 38%, terminal half-life $^1/_2$-3 hr

INTERACTIONS

Increase: bone marrow depression—antineoplastics, radiation, ganciclovir, valganciclovir, trimethoprim-sulfamethoxazole
Increase: zidovudine level—methadone, atovaquone, fluconazole, probenecid, trimethoprim, valproic acid; may need to reduce zidovudine dose
Decrease: zidovudine levels—interferons, NRTIs, DOXOrubicin, ribavirin, stavudine; avoid concurrent use
Drug/Lab Test
Decrease: platelets
Increase: LFTs

NURSING CONSIDERATIONS

Assess:
• Blood dyscrasias (anemia, granulocytopenia): bruising, fatigue, bleeding, poor healing

Black Box Warning: Blood counts q2wk; watch for decreasing granulocytes, Hgb; if low, therapy may have to be discontinued and restarted after hematologic recovery; blood transfusions may be required; viral load, CD4 counts, LFTs, plasma HIV RNA, serum creatinine/BUN at baseline and throughout treatment

Black Box Warning: Lactic acidosis, severe hepatomegaly with steatosis: Obtain baseline liver function tests, if elevated, discontinue treatment; discontinue even if liver function tests are normal but lactic acidosis, hepatomegaly are present; may be fatal

Perform/provide:
• Storage in cool environment; protect from light
Evaluate:
• Therapeutic response: decreased viral load, increased CD4 counts, decreased symptoms of HIV
Teach patient/family:
• That GI complaints and insomnia resolve after 3-4 wk of treatment
• That product not cure for AIDS but will control symptoms
• To notify prescriber of sore throat, swollen lymph nodes, malaise, fever because other infections may occur
• That patient is still infective, may pass AIDS virus on to others
• That follow-up visits must be continued because serious toxicity may occur; that blood counts must be done q2wk; that blood transfusions may be needed for severe anemia
• That product must be taken bid or tid
• That serious product interactions may occur if OTC products are ingested; to check with prescriber before taking aspirin, acetaminophen, indomethacin
• That other products may be necessary to prevent other infections
• That product may cause fainting or dizziness

zinc (Rx, otc)

Galzin
Func. class.: Trace element; nutritional supplement

ACTION: Needed for adequate healing, bone and joint development (23% zinc)

Z

USES: Prevention of zinc deficiency, adjunct to vit A therapy
Unlabeled uses: Wound healing
Precautions: Pregnancy (C) parenteral; breastfeeding, neonates, hypocupremia, neonatal prematurity, renal disease

DOSAGE AND ROUTES

Dietary supplement (elemental zinc)
- **Adult/adolescent/pregnant female: PO** 11-13 mg/day
- **Adult/lactating female: PO** 12-14 mg/day × 12 mo
- **Adult/adolescent male ≥14 yr: PO** 11 mg/day
- **Adult female ≥19 yr: PO** 8 mg/day
- **Adolescent female ≥14 yr: PO** 9 mg/day
- **Child 9-13 yr: PO** 8 mg/day
- **Child 4-8 yr: PO** 5 mg/day
- **Child 1-3 yr: PO** 3 mg/day
- **Infant 7-12 mo: PO** 3 mg/day
- **Infant birth to 6 mo: PO** 2 mg/day (adequate intake)

Nutritional supplement (IV)
- **Adult: IV** 2.5-4 mg/day; may increase by 2 mg/day if needed
- **Child 1-5 yr: IV** 50 mcg/kg/day

Wound healing
- **Adult: PO** 50 mg tid until healed (elemental zinc)

Available forms: Tabs 66, 110 mg; caps 220 mg; inj 1 mg, 5 mg/ml
Administer:
- With meals to decrease gastric upset; avoid dairy products

SIDE EFFECTS

GI: Nausea, vomiting, cramps, heartburn, ulcer formation
OVERDOSE: Diarrhea, rash, dehydration, restlessness

INTERACTIONS

Decrease: absorption of fluoroquinolones—tetracyclines
Drug/Food
Decrease: absorption of PO zinc—dairy products, caffeine

NURSING CONSIDERATIONS

Assess:
- **Zinc deficiency:** poor wound healing, absence of taste, smell, slowing growth
- Alkaline phosphatase, HDL monthly in long term therapy
- Zinc levels during treatment

Evaluate:
- Therapeutic response: absence of zinc deficiency

Teach patient/family:
- That element must be taken for 2-3 mo to be effective
- To immediately report nausea, diarrhea, rash, severe vomiting, restlessness, abdominal pain, tarry stools

ziprasidone (Rx)

(zi-praz'ih-dohn)
Geodon, Zeldox ♣
Func. class.: Antipsychotic/neuroleptic
Chem. class.: Benzisoxazole derivative

ACTION: Unknown; may be mediated through both dopamine type 2 (D_2) and serotonin type 2 ($5\text{-}HT_2$) antagonism

USES: Schizophrenia, acute agitation, acute psychosis, bipolar disorder, mania, psychotic depression
Unlabeled uses: Tourette's syndrome

CONTRAINDICATIONS: Breastfeeding, hypersensitivity, acute MI, heart failure, QT prolongation
Precautions: Pregnancy (C), children, geriatric patients, cardiac/renal/hepatic disease, breast cancer, diabetes, seizure disorders, AV block, CNS depression

Black Box Warning: Increased mortality in geriatric patients with dementia-related psychosis

DOSAGE AND ROUTES

Schizophrenia

• **Adult: PO** 20 mg bid with food, adjust dosage every 2 days upward to max of 80 mg bid; **IM** 10-20 mg; may give 10 mg q2hr; doses of 20 mg may be given q4hr; max 40 mg/day (acute episodes); switch to PO as soon as possible

Bipolar disorder

• **Adult: PO** 40 mg bid with food; on day 2 increase to 60 or 80 mg bid, then adjust to response; maintenance as adjunct to lithium/valproate 40-80 mg bid

Tourette's syndrome (unlabeled)

• **Adolescent and child ≥7 yr: PO** 5 mg/day, may increase in divided doses to 20 mg bid

Available forms: Caps 20, 40, 60, 80 mg; inj 20 mg/ml single-dose vials

Administer:

PO route

• Reduced dose in geriatric patients

• Anticholinergic agent on order from prescriber to be used for EPS

IM route

• Add 1.2 ml sterile water for inj to vial; shake vigorously until dissolved; do not admix; give only IM

SIDE EFFECTS

CNS: *EPS, pseudoparkinsonism, akathisia, dystonia, tardive dyskinesia; drowsiness, insomnia, agitation, anxiety, headache,* seizures, neuroleptic malignant syndrome, dizziness, tremor, facial droop

CV: Orthostatic hypotension, tachycardia, prolonged QT/QTc, hypertension; sudden death, heart failure (geriatric patients), torsades de pointes

EENT: Blurred vision, diplopia

ENDO: Metabolic changes

GI: *Nausea,* vomiting, *anorexia, constipation,* jaundice, weight gain, diarrhea, dry mouth, abdominal pain

GU: Enuresis, urinary incontinence, gynecomastia, impotence, priapism

RESP: Rhinitis, dyspnea, infection, cough

PHARMACOKINETICS

PO: Extensively metabolized by liver to major active metabolite, plasma protein binding 90%, peak 6-8 hr, terminal half-life 7 hr

INTERACTIONS

⚠ Increase: QT prolongation—class IA/III antidysrhythmics, some phenothiazines, β-agonists, local anesthetics, tricyclics, haloperidol, methadone, chloroquine, clarithromycin, droperidol, erythromycin, pentamidine, moxifloxacin

Increase: sedation—other CNS depressants, alcohol

Increase: EPS, possible neurotoxicity—other antipsychotics, lithium

Increase: ziprasidone excretion—carBAMazepine

Increase: ziprasidone level—ketoconazole

Increase: hypotension—antihypertensives

Increase: serotonin syndrome, neuroleptic malignant syndrome—SSRIs, SNRIs

NURSING CONSIDERATIONS

Assess:

• Mental status before initial administration

Black Box Warning: Geriatric patient with dementia closely; heart failure, sudden death have occurred

• Bilirubin, CBC, LFTs, fasting blood glucose monthly

• Urinalysis before, during prolonged therapy

• B/P standing and lying; also pulse, respirations; take these q4hr during initial treatment; establish baseline before starting treatment; report drops of 30 mm Hg; watch for ECG changes; QT prolongation may occur

• Dizziness, faintness, palpitations, tachycardia on rising; metabolic changes, weight gain

• **EPS,** including akathisia (inability to sit still, no pattern to movements), tardive dyskinesia (bizarre movements of

Z

the jaw, mouth, tongue, extremities), pseudoparkinsonism (rigidity, tremors, pill rolling, shuffling gait)

⚠ **Neuroleptic malignant syndrome, serotonin syndrome:** hyperthermia, increased CPK, altered mental status, muscle rigidity

• Constipation, urinary retention daily; if these occur, increase bulk and water in diet

Perform/provide:

• Supervised ambulation until patient is stabilized on medication; do not involve patient in strenuous exercise program because fainting is possible; patient should not stand still for a long time

• Increased fluids to prevent constipation

• Storage in tight, light-resistant container

Evaluate:

• Therapeutic response: decrease in emotional excitement, hallucinations, delusions, paranoia; reorganization of patterns of thought, speech

Teach patient/family:

• That orthostatic hypotension may occur; to rise from sitting or lying position gradually

• To avoid hot tubs, hot showers, tub baths because hypotension may occur

• To avoid abrupt withdrawal of product because EPS may result; that product should be withdrawn slowly

• To avoid OTC preparations (cough, hay fever, cold) unless approved by prescriber because serious product interactions may occur; to avoid use with alcohol because increased drowsiness may occur

• To avoid hazardous activities if drowsy or dizzy

• To report impaired vision, tremors, muscle twitching

• In hot weather, that heat stroke may occur; to take extra precautions to stay cool

TREATMENT OF OVERDOSE:

Lavage if orally ingested; provide airway; *do not induce vomiting*

zoledronic acid (Rx)

(zoh'leh-drah'nick ass'id)

Reclast, Zometa

Func. class.: Bone-resorption inhibitor

Chem. class.: Bisphosphonate

ACTION:

Potent inhibitor of osteoclastic bone resorption; inhibits osteoclastic activity, skeletal calcium release caused by stimulating factors released by tumors; reduction of abnormal bone resorption is responsible for therapeutic effect with hypercalcemia; may directly block dissolution of hydroxyapatite bone crystals

USES:

Moderate to severe hypercalcemia associated with malignancy; multiple myeloma; bone metastases from solid tumors (used with antineoplastics); active Paget's disease; osteoporosis, glucocorticoid-induced osteoporosis, osteoporosis prophylaxis in postmenopausal women

CONTRAINDICATIONS:

Pregnancy (D), breastfeeding; hypersensitivity to this product or bisphosphonates; hypocalcemia

Precautions: Children, geriatric patients, renal dysfunction, asthmatic patients, acute bronchospasm, anemia, chemotherapy, coagulopathy, dehydration, dental disease, diabetes mellitus, renal disease, electrolyte imbalance, hypertension, hypovolemia, infection, multiple myeloma, phosphate hypersensitivity

DOSAGE AND ROUTES

Hypercalcemia of malignancy

• **Adult: IV INF** 4 mg, given as single inf over ≥15 min; may re-treat with 4 mg if serum calcium does not return to normal within 1 wk

Multiple myeloma/metastatic bone lesions
• **Adult: IV INF** 4 mg, give over 15 min q3-4wk
Osteoporosis
• **Adult: IV INF** 5 mg over ≥15 min q12mo
Active Paget's disease
• **Adult: IV INF** 5 mg over ≥15 min
Osteoporosis prophylaxis (Reclast), postmenopausal women
• **Adult: IV INF** 5 mg every other year
Osteoporosis prophylaxis (Reclast) when taking systemic glucocorticoids
• **Adult: IV** 5 mg every yr
Early breast cancer (unlabeled)
• **Adult: IV** 4 mg q6mo with goserelin 3.6 mg SUBCUT monthly and tamoxifen 20 mg daily or anastrozole 1 mg daily for 3 yr
Available forms: (Zometa) sol for inj 4 mg/5 ml; (Reclast) inj 5 mg/100 ml
Administer:
• Saline hydration must be performed before administration; urine output should be 2 L/day during treatment; do not overhydrate patient
IV route
Zometa
• Administer after reconstituting by adding 5 ml of sterile water for inj to each vial then add to ≥100 ml of sterile 0.9% NaCl, D_5W; run over ≥15 min
• Administer in separate IV line from all other products
Reclast
• No further dilution required
• Infuse over ≥15 min at constant rate; max 5 mg

SIDE EFFECTS

CNS: Dizziness, headache, anxiety, confusion, insomnia, agitation
CV: Hypotension, leg edema, atrial fibrillation, chest pain
GI: Abdominal pain, anorexia, constipation, nausea, diarrhea, vomiting, taste change
GU: UTI, possible reduced renal function, renal damage
META: Anemia, hypokalemia, hypomagnesemia, hypophosphatemia, hypocalcemia, increased serum creatinine
MISC: *Fever, chills, flulike symptoms*
MS: Severe bone pain, *arthralgias, myalgias,* osteonecrosis of jaw

PHARMACOKINETICS

Rapidly cleared from circulation, taken up mainly by bones, not metabolized, eliminated primarily by kidneys, approximately 50% eliminated in urine within 24 hr, max effect 7 days; terminal half-life 167 hr, protein binding 22%

INTERACTIONS

• Hypomagnesemia, hypokalemia: digoxin
Decrease: effect of zoledronic acid—calcium, vit D
Decrease: serum calcium, aminoglycosides, loop diuretics
• Do not mix with calcium-containing infusion sol such as lactated Ringer's sol
Increase: nephrotoxicity—aminoglycosides, NSAIDs, radiopaque contrast agents
Drug/Lab Test
Increase: creatinine
Decrease: calcium, phosphorous, magnesium, potassium, Hct/Hgb, RBC, platelets, WBC

NURSING CONSIDERATIONS

Assess:
• Renal tests, calcium, phosphate, magnesium, potassium; creatinine, BUN; if creatinine elevated, hold treatment
• **Hypocalcemia:** paresthesia, twitching, laryngospasm; Chvostek's/Trousseau's signs
• Dental status; cover with antiinfectives for dental extraction
• Atrial fibrillation
Perform/provide:
• Sol reconstituted with sterile water may be stored under refrigeration for up to 24 hr
• Acetaminophen before and for 72 hr after to decrease pain

Evaluate:
- Therapeutic response: decreased calcium levels, increased bone density

Teach patient/family:
- To report hypercalcemic relapse: nausea, vomiting, bone pain, thirst
- To continue with dietary recommendations, including calcium and vit D; to take a multiple vitamin daily as well as 500 mg of calcium, 400 international units vit D with multiple myeloma
- If nausea or vomiting occurs, to eat small, frequent meals, to use lozenges or chewing gum
- If bone pain occurs, to notify prescriber to obtain analgesics
- To avoid use during pregnancy (D)
- To continue good oral hygiene

ZOLMitriptan (Rx)

(zole-mih-trip'tan)

Zomig, Zomig-ZMT

Func. class.: Migraine agent, abortive

Chem. class.: $5\text{-HT}_{1B}/5\text{HT}_{1D}$ receptor agonist (triptan)

ACTION: Binds selectively to the vascular $5\text{-HT}_{1B}/5\text{HT}_{1D}$ receptor subtype, exerts antimigraine effect; causes vasoconstriction in cranial arteries

USES: Acute treatment of migraine with/without aura

CONTRAINDICATIONS: Angina pectoris, history of MI, documented silent ischemia, ischemic heart disease, uncontrolled hypertension, hypersensitivity, basilar or hemiplegic migraine, risk of CV events

Precautions: Pregnancy (C), breastfeeding, children, postmenopausal women, men >40 yr, geriatric patients, risk factors for CAD, hypercholesterolemia, obesity, diabetes, impaired renal/hepatic function

DOSAGE AND ROUTES

- **Adult: PO** start at ≤2.5 mg (tab may be broken), may repeat after 2 hr, max 10 mg/24 hr; **NASAL** 1 spray in 1 nostril at onset of migraine, repeat in 2 hr if no relief

Available forms: Tabs 2.5, 5 mg; orally disintegrating tabs 2.5, 5 mg; nasal spray 5 mg

Administer:
- Take with fluids as soon as symptoms of migraine occur
- **Orally disintegrating tab:** do not crush or chew, allow to dissolve on tongue

SIDE EFFECTS

CNS: *Tingling, hot sensation, burning, feeling of pressure, tightness, numbness, dizziness, sedation*
CV: Palpitations, chest pain
GI: Abdominal discomfort, nausea, dry mouth, dyspepsia, dysphagia
MISC: Odd taste (spray)
MS: *Weakness, neck stiffness,* myalgia
RESP: Chest tightness, pressure

PHARMACOKINETICS

Duration 2-3½ hr; 25% plasma protein binding; half-life 3-3½ hr; metabolized in liver (metabolite); excreted in urine (60-80%), feces (20-40%)

INTERACTIONS

⚠ Extended vasospastic effects: ergot, ergot derivatives
⚠ Do not use within 2 wk of MAOIs
⚠ Weakness, hyperreflexia, incoordination: SSRIs (FLUoxetine, fluvoxaMINE, PARoxetine, sertraline)
Increase: half-life of ZOLMitriptan—cimetidine, oral contraceptives
Increase: ZOLMitriptan levels—sibutramine

Drug/Herb
- Serotonin syndrome: SAM-e, St. John's wort

Drug/Lab Test
Increase: alk phos

NURSING CONSIDERATIONS

Assess:

- Tingling, hot sensation, burning, feeling of pressure, numbness, flushing
- Neurologic status: LOC, blurring vision, nausea, vomiting, tingling in extremities preceding headache
- Ingestion of tyramine foods (pickled products, beer, wine, aged cheese), food additives, preservatives, colorings, artifical sweeteners, chocolate, caffeine, which may precipitate these types of headaches
- **Serotonin syndrome** if also taking SSRI

Evaluate:

- Therapeutic response: decrease in frequency, severity of headache

Teach patient/family:

- To report any side effects to prescriber
- To use contraception while taking product
- That product does not prevent or reduce number of migraines
- To report chest pain, rash, swelling of face
- Not to double doses, if second dose is needed, wait at least 2 hr

zolpidem (Rx)

(zole'pih-dem)

Ambien, Ambien CR, Edluar, Zolpimist

Func. class.: Sedative/hypnotic

Chem. class.: Imidazopyridine

Controlled Substance Schedule IV

ACTION: Produces CNS depression at limbic, thalamic, hypothalamic levels of CNS; may be mediated by neurotransmitter γ-aminobutyric acid (GABA); results are sedation, hypnosis, skeletal muscle relaxation, anticonvulsant activity, anxiolytic action

USES: Insomnia, short-term treatment; insomnia with difficulty of sleep onset/maintenance (ext rel)

CONTRAINDICATIONS: Hypersensitivity to benzodiazepines

Precautions: Pregnancy (C), breastfeeding, children <18 yr, geriatric patients, anemia, renal/hepatic disease, suicidal individuals, drug abuse, psychosis, seizure disorders, angioedema, depression, respiratory disease, sleep apnea, sleep-related behaviors (sleepwalking), myasthenia gravis

DOSAGE AND ROUTES

- **Adult: PO** 5 mg (women), 5-10 mg (men) at bedtime × 7-10 days only; total max dose 10 mg; **EXT REL** 6.25 (women), 6.25-12.5 mg (men) immediately before bedtime, may be useful for ≤24 wk in people 18-64 yr with primary insomnia; **oral spray** (Zolpimist) 5 mg (women), 5-10 mg (men) immediately before bedtime, max 10 mg/day; **SL** (Edluar) 5 mg (women), 5-10 mg (men) just before bedtime
- **Geriatric: PO** 5 mg at bedtime; **EXT REL** 6.25 mg; SL: 5 mg at bedtime

Available forms: Tabs 5, 10 mg; ext rel tabs 6.25, 12.5 mg; SL: 5, 10 mg; oral spray 5 mg/spray

Administer:

PO route

- Do not break, crush, or chew ext rel
- Take with full glass of water
- ½-1 hr before bedtime (PO); right before retiring (ext rel)
- On empty stomach for fast onset; may be taken with food if GI symptoms occur

Spray route

- Prime before first use or if pump is not used for ≥14 days
- Do not use spray with or after a meal

Sublingual route

- Separate blister pack at perforation, peel paper and push product through, place product under tongue, allow to dissolve before swallowing; do not take with water

SIDE EFFECTS

CNS: Headache, lethargy, drowsiness, daytime sedation, dizziness, confusion, lightheadedness, anxiety, irritability, amnesia, poor coordination, complex sleep-related reactions (sleep driving, sleep eating), depression, somnolence, suicidal ideation, abnormal thinking/behavioral changes
CV: Chest pain, palpitations
GI: Nausea, vomiting, diarrhea, heartburn, abdominal pain, constipation
HEMA: Leukopenia, granulocytopenia (rare)
MISC: Myalgia
SYST: Severe allergic reactions, angioedema, anaphylaxis

PHARMACOKINETICS

PO: Onset up to 1.5 hr, metabolized by liver, excreted by kidneys (inactive metabolites), crosses placenta, excreted in breast milk, half-life 2-3 hr

INTERACTIONS

Increase: action of both products—alcohol, CNS depressants
Increase or decrease: zolpidem levels—CYP3A4 inhibitors/inducers
Decrease: zolpidem effect—rifamycins

NURSING CONSIDERATIONS

Assess:
⚠ Mental status: mood, sensorium, affect, memory (long, short term), excessive sedation, impaired coordination, **suicidal thoughts/behaviors**
• Blood dyscrasias: fever, sore throat, bruising, rash, jaundice, epistaxis (rare)
• Type of sleep problem: falling asleep, staying asleep
Perform/provide:
• Storage in tight container in cool environment
Evaluate:
• Therapeutic response: ability to sleep at night, decreased amount of early morning awakening if taking product for insomnia
Teach patient/family:
• That dependence is possible after long-term use
⚠ That complex sleep-related behaviors may occur (sleep driving/eating)
• To avoid driving or other activities requiring alertness until dosage is stabilized
• To avoid alcohol ingestion
• That effects may take 2 nights for benefits to be noticed
• Not to use during pregnancy, breastfeeding
• That hangover is common in geriatric patients but less common than with barbiturates; that rebound insomnia may occur for 1-2 nights after discontinuing product; not to discontinue abruptly; to taper
• Not to crush, chew, break ext rel tabs
• To prime spray pump before using

TREATMENT OF OVERDOSE:

Lavage, activated charcoal; monitor electrolytes, VS

zonisamide (Rx)

(zone-is'a-mide)
Zonegran
Func. class.: Anticonvulsant
Chem. class.: Sulfonamides

ACTION: May act through action at sodium and calcium channels, but exact action is unknown; serotonergic action

USES: Epilepsy, adjunctive therapy for partial seizures
Unlabeled uses: Bipolar disorder (mania)

CONTRAINDICATIONS: Hypersensitivity to this product or sulfonamides; psychiatric condition, hepatic failure
Precautions: Pregnancy (C), breastfeeding, children <16 yr, geriatric patients, allergies, renal/hepatic disease

DOSAGE AND ROUTES

• **Adult and child >16 yr:** 100 mg/day, may increase after 2 wk to 200 mg/day, may increase q2wk, max dose 600 mg/day

Available forms: Caps 25, 50, 100 mg

SIDE EFFECTS

CNS: Dizziness, insomnia, paresthesias, depression, fatigue, headache, confusion, somnolence, agitation, irritability, speech disturbance, suicidal ideation, seizures, status epilepticus

EENT: Diplopia, verbal difficulty, speech abnormalities, taste perversion, amblyopia, pharyngitis, rhinitis, tinnitus, nystagmus

GI: Nausea, constipation, anorexia, weight loss, diarrhea, dyspepsia, dry mouth, abdominal pain

GU: Kidney stones

HEMA: Aplastic anemia, granulocytopenia (rare); ecchymosis

INTEG: Rash, pruritus

MISC: Flulike symptoms

SYST: Stevens-Johnson syndrome, metabolic acidosis

PHARMACOKINETICS

Peak 2-6 hr, half-life in RBCs 105 hr, metabolized by liver, excreted by kidneys, protein binding 40%

INTERACTIONS

Decrease: half-life of zonisamide—carBAMazepine, phenytoin, PHENobarbital

Altered product levels: CYP3A4 inhibitors/inducers

Increase: CNS depression—alcohol

Drug/Herb

Increase: effect of this product—St. John's wort

Drug/Food

• Do not use with grapefruit

Drug/Lab Test

Increase: BUN, creatinine

NURSING CONSIDERATIONS

Assess:

• **Seizures:** duration, type, intensity, precipitating factors

• Renal function: albumin conc, BUN, creatinine, serum bicarbonate at baseline and periodically

⚠ Mental status: mood, sensorium, affect, memory (long, short term), **suicidal thoughts/behaviors**

• Stevens-Johnson syndrome, aplastic anemia, fulminant hepatic necrosis; may cause death; monitor for rashes and hypersensitive reactions

• Rash, hypersensitivity reactions

• Obtain bicarbonate before treatment/periodically; metabolic acidosis may occur in child

Evaluate:

• Therapeutic response: decrease in severity of seizures

Teach patient/family:

• Not to discontinue product abruptly because seizures may occur

• To avoid hazardous activities until stabilized on product

• To carry emergency ID stating product use

• To notify prescriber of rash immediately; to notify prescriber of back pain, abdominal pain, blood in urine; to increase fluid intake to reduce risk of kidney stones

• To notify prescriber if pregnancy planned, suspected

• To avoid grapefruit

• To notify prescriber of sore throat, fever, easy bruising

Recent FDA drug approvals

Generic	Trade	Use
alogliptin	Nesina	Diabetes Mellitus II
bedaquiline	Sirturo	Tuberculosis
crofelemer	Fulyzaq	Non-infectious diarrhea
lomitapide	Juxtapid	Hypercholestrolemia
pomalidomide	Pomalyst	Multiple Myeloma
raxibacumab	n/a	Anthrax
teduglutide	Gattex	Intestinal failure

Appendix A

Selected new drugs

alogliptin

(al'oh-glip'tin)

Nesina

Func. class.: Antidiabetic

Chem. class.: Dipeptidyl peptidase-4 (DPP-4) inhibitor

ACTION: A dipeptidyl-peptidase-IV (DDP-IV) inhibitor for the treatment of type 2 diabetes mellitus (monotherapy or in combination with other antidiabetic agents), potentiates the effects of the incretin hormones by inhibiting their breakdown by DDP-IV

USES: Type 2 diabetes mellitus (T2DM)

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (B), breastfeeding, hepatic disease, burns, ketoacidosis, diarrhea, fever, GI obstruction, hyper/hypoglycemia, hyper/hypothyroidism, type 1 diabetes, hypercortisolism, children, ileus, malnutrition, pancreatitis, surgery, trauma, vomiting, kidney disease, adrenal insufficiency

Black Box Warning: Angioedema

DOSAGE AND ROUTES

• **Adult: PO** 25 mg/day; when used in combination, a lower dose of the other antidiabetic may be needed

Renal dose

• **Adult: PO** CCr 30–59 ml/min: 12.5 mg q day; CCr <30 ml/min: 6.25 mg q day; intermittent hemodialysis: 6.25 mg q day; give without regard to the timing of hemodialysis

Available forms: Tab 6.25, 12.5, 25

Administer:

• Without regard to food

SIDE EFFECTS

CNS: Headache

GI: Pancreatitis

META: Hypoglycemia

RESP: Upper respiratory infection, nasopharyngitis

SYST: Rash, hypersensitivity, angioedema, Stevens–Johnson syndrome

PHARMACOKINETICS

20% protein binding, excreted unchanged (urine), peak 1-2 hr, effect decreased in liver disease and increased in kidney disease

INTERACTIONS

Drug/Lab Test

Increase: LFTs

NURSING CONSIDERATIONS

Assess:

• **Diabetes:** monitor blood glucose, glycosylated hemoglobin A1c (A1c), LFTs, serum creatinine/BUN

⚠ **Pancreatitis:** Can occur during use

⚠ **Hypersensitivity reactions:** angioedema, Stevens–Johnson syndrome; product should be discontinued

Evaluate:

• Positive therapeutic response: Decrease in polyuria, polydipsia, polyphagia, clear sensorium, absence of dizziness, improvement in A1c, daily blood glucose monitoring

Teach patient/family:

• That diabetes is a life-long condition, product does not cure disease

- That all food in diet plan must be eaten to prevent hypoglycemia; to continue with weight control, dietary medical nutrition therapy, physical activity, hygiene
- To carry emergency ID with prescriber, medications, and condition listed
- To test blood glucose using a blood glucose meter

bosutinib

(boe-sue'ti-nib)

Bosulif

Func. class.: Antineoplastic biologic response modifiers

Chem. class.: Signal transduction inhibitors (STIs), tyrosine kinase inhibitor

ACTION: Inhibits bcr-abl tyrosine kinase created in patients with chronic myeloid leukemia (CML)

USES: Treatment of CML; Philadelphia-chromosome–positive patients in blast-cell crisis

CONTRAINDICATIONS: Pregnancy (D), hypersensitivity

Precautions: Breastfeeding, children, diarrhea, geriatric patients, hepatic disease, bone marrow suppression, infection, thrombocytopenia, neutropenia, immunosuppression

DOSAGE AND ROUTES

- **Adult: PO** 500 mg daily with food, may increase to 600 mg/day in those who have not developed grade 3 toxicity or in patients who do not reach complete hematological response by wk 8 or complete cytogenic response (CCyR) by wk 12

Hepatic dosage

- **Adult: PO** Any baseline hepatic impairment: Start at 200 mg/day; liver transaminase $>5 \times$ ULN, hold dose until levels are $\leq 2.5 \times$ ULN, then resume at 400 mg/day; liver transaminase level $\geq 3 \times$ ULN and bilirubin $>2 \times$ ULN and alk phos $<2 \times$ ULN, discontinue

Dosage adjustments for treatment-related toxicity

Hematologic toxicity:

⚠ *ANC $<1000 \times 10^6$/L or platelet count $<50{,}000 \times 10^6$/L:* hold dose until ANC is $\geq 1000 \times 10^6$/L and platelets are $\geq 50{,}000 \times 10^6$/L; if recovery within 2 wk, resume therapy at the same dosage; if blood counts remain low after 2 wk, upon recovery, resume at 100 mg/day less than the previous dosage

Diarrhea:

⚠ *Grade 3 or 4 diarrhea (≥7 stools/day compared with baseline):* hold therapy until recovery to grade 1 toxicity or lower; resume therapy at 400 mg/day

Other nonhematologic toxicity:

⚠ *Significant or moderate or severe toxicity:* hold therapy until toxicity resolves; resume therapy at 400 mg/day

Available forms: Tabs 100, 500 mg

Administer:

PO route

- Give with food; swallow whole
- If dose is missed, take within 12 hr of missed dose; if >12 hr have passed, skip dose
- Follow cytotoxic handling procedures

SIDE EFFECTS

CNS: Headache, dizziness

GI: Nausea, vomiting, anorexia, abdominal pain, diarrhea

HEMA: Neutropenia, thrombocytopenia, bleeding

INTEG: Rash, pruritus

MS: Arthralgia, myalgia

RESP: Cough, dyspnea, pleural effusion, edema

OTHER: Elevated LFTs

PHARMACOKINETICS

Protein binding 96%; metabolized by CYP3A4; half-life 22.5 hr

INTERACTIONS

Increase: bosutinib concentrations—CYP3A4 inhibitors (ketoconazole, itraconazole, erythromycin, clarithromycin)

Increase: plasma concentrations of simvastatin, calcium channel blockers, ergots

Decrease: bosutinib concentrations—CYP3A4 inducers (dexamethasone, phenytoin, carBAMazepine, rifampin, PHENobarbital), antacids, proton-pump inhibitors

Drug/Food

Increase: increase bosutinib effect—grapefruit juice; avoid use while taking product

Drug/Herb

Decrease: bosutinib concentration—St. John's wort

NURSING CONSIDERATIONS

Assess:

⚠ **Myelosuppression: anemia, thrombocytopenia, neutropenia; obtain a CBC weekly × 1 mo, then monthly as needed**

• LFTs every mo × 3 mo, then as clinically indicated

Evaluate:

• Therapeutic response: decrease in leukemic cells or size of tumor

Teach patient/family:

• To report adverse reactions immediately, bleeding

• About reason for treatment, expected results

• To use effective contraception during treatment and up to 30 days after discontinuing treatment

cabozantinib

(ka'boe-zan'ti-nib)

Cometriq

Func. class.: Antineoplastic biologic response modifiers

Chem. class.: Signal transduction inhibitor (STI)

ACTION: Inhibits abnormal tyrosine kinase associated with growth and development of metastatic medullary thyroid cancer

USES: Treatment of progressive metastatic medullary thyroid cancer

CONTRAINDICATIONS: Pregnancy (D), hypersensitivity

Precautions: Breastfeeding, children, geriatric patients, cardiac/renal/hepatic/dental disease, bone marrow suppression, wound dehiscence, skin disease MI, hypertension, proteinuria, infertility, surgery, thrombocytopenia, neutropenia, immunosuppression

Black Box Warning: Bleeding, fistula, GI bleeding/perforations

DOSAGE AND ROUTES

• **Adult: PO** 140 mg/day until disease progression or unacceptable toxicity

• Avoid the concomitant use of strong 3A4 inhibitors or inducers if possible; temporary interruption of therapy and a dosage reduction may be necessary in patients who develop toxicity or intolerable side effects

Available forms: Tabs 60, 100, 140 mg

Administer:

• Take on an empty stomach; do not eat for ≥2 hr before and ≥1 hr after use; swallow whole; do not open or crush caps

• Do not take with grapefruit juice

• Do not take a missed dose within 12 hr of the next dose; if the next dose is in 12 hr or more, take the missed dose; if the next dose is in less than 12 hr, skip the missed dose and take the next dose at the scheduled time

• Store at room temperature

Dosage adjustments for treatment-related toxicity:

⚠ ***Grade 4 hematologic toxicity, grade 3 or higher nonhematologic toxicity, or intolerable grade 2 toxicity:*** Hold until resolution/improvement, then reduce the daily dosage by 40 mg (eg, 140 mg/day to 100 mg/day or 100 mg/day to 60 mg/day)

Dosage guidance in patients on strong CYP3A4 inducers/inhibitors:

⚠ ***Strong CYP3A4 inhibitors:*** Avoid use if possible; if a strong CYP3A4 inhibitor is used, reduce the daily cabozantinib dosage by 40 mg; resume the prior dosage after 2 or 3 days if the strong CYP3A4 inhibitor is discontinued

⚠ ***Strong CYP3A4 inducers:*** Avoid chronic concomitant use if possible; if a strong CYP3A4 inducer is required, increase the daily cabozantinib dosage by 40 mg, max 180 mg/day; resume the prior dosage after 2 or 3 days if the strong CYP3A4 inducer is discontinued

SIDE EFFECTS

CNS: Headache, dizziness
GI: Nausea, vomiting, dyspepsia, anorexia, abdominal pain, diarrhea, GI bleeding/fistula/perforation
HEMA: Neutropenia, thrombocytopenia, bleeding
INTEG: Rash
META: Hypokalemia
MISC: Fatigue, hypothyroidism, elevated liver enzymes
MS: Arthralgia, myalgia

PHARMACOKINETICS

Protein binding 99%, metabolized by CYP3A4

INTERACTIONS

Increase: cabozantinib concentrations—CYP3A4 inhibitors (ketoconazole, itraconazole, erythromycin, clarithromycin)
Increase: plasma concentrations of simvastatin, calcium channel blockers, ergots
Decrease: cabozantinib concentrations—CYP3A4 inducers (dexamethasone, phenytoin, carBAMazepine, rifampin, PHENobarbital)

Drug/Food
Increase: cabozantinib effect—grapefruit juice; avoid use while taking product

Drug/Herb
Cabozantinib concentration—St. John's wort

NURSING CONSIDERATIONS

Assess:
⚠ **Proteinuria:** monitor urine protein regularly; discontinue if nephritic syndrome occurs
⚠ **GI bleeding/fistula/perforation:** can be fatal
⚠ **Wound dehiscence:** discontinue product ≥20 days before surgery

Evaluate:
• Therapeutic response: decrease in size, spread of tumor

Teach patient/family:
• To report adverse reactions immediately: bleeding
• About reason for treatment, expected results
• That effect on male infertility is unknown

carfilzomib

(car-fil'zoe-mib)

Kyprolis

Func. class.: Antineoplastic biologic response modifiers

Chem. class.: Signal transduction inhibitors (STIs)

ACTION: Antiproliferative and proapoptotic activity

USES: Multiple myeloma in those who have received ≥2 therapies (including bortezomib and immunomodulatory agents)

CONTRAINDICATIONS:

Pregnancy (D), hypersensitivity
Precautions: Breastfeeding, children, cardiac disease, cardiac arrest, dysrhythmias, MI, infusion-related reactions, pulmonary/hepatic disease, edema, thrombocytopenia, neutropenia, tumor lysis syndrome

DOSAGE AND ROUTES

• **Adult: IV** 20 mg/m^2 over 2-10 min on days 1, 2, 8, 9, 15, 16, then 12 day rest (days 17-28), then may increase to 27 mg/m^2 on days 1, 2, 8, 9, 15, 16 repeated every 28 days
⚠ Refer to package insert for dosage adjustments for treatment-related toxicity
Available forms: Powder for injection 60 mg

Administer:

- Premedicate with dexamethasone 4 mg PO/IV before all carfilzomib 20-mg/m² doses during cycle 1 and before all carfilzomib 27-mg/m² doses in cycle 2; dexamethasone may be given in subsequent cycles if infusion-related reactions occur
- Hydration with 250–500 ml of NS or other IV fluids before each dose in cycle 1; additional hydration with 250–500 ml may be given after the carfilzomib infusion in cycle 1, continue hydration as needed
- Do not mix with other products
- Flush IV line with NS or D_5 for injection, before and after use

Reconstitution:

- Add 29 ml of sterile water for injection to the inside wall of the vial to minimize foaming (2 mg/mL); to mix, gently swirl and/or invert the vial slowly for about 1 min or until the cake or powder completely dissolves; do not shake; if foaming occurs, allow the solution to rest for 2 to 5 min or until foaming subsides; visually inspect for particulate and discoloration before use

IV injection route

- Give over 2-10 min; do not give as an IV bolus; the reconstituted sol may be stored in the vial/syringe at room temperature × 4 hr or ≤24 hr refrigerated

IV infusion route

- May further dilute in D_5W; measure and inject the correct dose from the reconstituted vial into 50 ml D_5W
- Administer IV over 2-10 min
- The diluted solution may be stored at room temperature × 4 hr or ≤24 hr refrigerated

SIDE EFFECTS

CNS: Headache, dizziness, insomnia
CV: Heart failure
GI: Nausea, vomiting, dyspepsia, anorexia, diarrhea
HEMA: Neutropenia, thrombocytopenia
META: Hyperglycemia, hypercalcemia, hypomagnesemia, hyponatremia, hypophosphatemia
MISC: Fatigue
MS: Arthralgia, myalgia

PHARMACOKINETICS

Protein binding 97%

NURSING CONSIDERATIONS

Assess:

⚠ Tumor lysis syndrome (TLS): hydrate well; assess for hyperuricemia, hyperkalemia, hyperphosphatemia, hypocalcemia, uremia

⚠ Hematologic toxicity grade 3 and 4 neutropenia and thrombocytopenia; platelet nadirs occur day 8 of each 28-day cycle; counts return to baseline before the start of the next cycle; monitor blood and platelet counts frequently; hold dose for grade 3 or 4 neutropenia or grade 4 thrombocytopenia, may require dosage reduction

⚠ Serious liver toxicity: AST/ALT and bilirubin elevations and rare cases of fatal hepatic failure have occurred; monitor hepatic enzymes frequently; withhold doses until resolution or return to baseline in grade 3 or 4AST/ALT or bilirubin elevations

⚠ Serious cardiac toxicity: fatal cardiac arrest, CHF with decreased left ventricular function/ejection fraction, myocardial ischemia, and pulmonary edema; those with NYHA class III/ IV CHF, MI within 6 mo, cardiac arrhythmias (conduction abnormalities) may be at increased risk; monitor for cardiac complications; withhold doses until resolution or return to baseline for grade 3 or 4 cardiac toxicity

⚠ Infusion-related reactions: may occur ≤24 hr after dose; premedication with dexamethasone is recommended; assess for fever, chills, arthralgia, myalgia, facial flushing, facial edema, vomiting, weakness, shortness of breath, hypotension, syncope, chest tightness, angina

Evaluate:

- Decreased spread of multiple myeloma

Teach patient/family:
• To promptly report infusion-related symptoms (fever, chills, arthralgia, myalgia, facial flushing, facial edema, vomiting, weakness, shortness of breath, hypotension, syncope, chest tightness, angina)

enzalutamide

(en-zal-u'ta-mide)

Xtandi

Func. class.: Antineoplastic hormone

Chem. class.: Nonsteroidal antiandrogen

ACTION: Binds to cytosolic androgen receptors in target tissue, which competitively inhibits the action to androgens

USES: Metastatic castration-resistant prostate cancer in those who have received docetaxel

CONTRAINDICATIONS: Pregnancy (X), women, hypersensitivity
Precautions: Breastfeeding, brain tumor, head trauma, infertility, seizures, stroke, male-mediated teratogenicity

DOSAGE AND ROUTES

• **Adult: PO** 160 mg (4 × 40-mg caps) daily
• If a patient experiences a grade 3 or higher toxicity or an intolerable adverse effect, withhold dosing for 1 wk or until symptoms improve to grade 2 or less, then resume at the same or a reduced dosage (120 or 80 mg), if warranted
• The concomitant use of strong cytochrome P450 (CYP-450) 2C8 inhibitors should be avoided if possible; if a strong CYP2C8 inhibitor must be coadministered, reduce the enzalutamide dosage to 80 mg once daily
Available forms: Tabs 40 mg
Administer:
• At same time each day, without regard to food
• Swallow whole

SIDE EFFECTS

CNS: Dizziness, paresthesias, insomnia, anxiety, headache
CV: Hot flashes, hypertension
GU: Urinary frequency
INTEG: Dry skin, pruritus
MISC: Infection, asthenia

PHARMACOKINETICS

Terminal half-life 2.8 to 10.2 days, 97% to 98% protein binding

INTERACTIONS

Increase: anticoagulation—anticoagulants
Increase: enzalutamide effects—CYP3A4 inhibitors (amiodarone, antiretrovirals, protease inhibitors, clarithromycin, dalfopristin, quinupristin, delavirdine, efavirenz, erythromycin, FLUoxetine, fluvoxaMINE, imatinib, mifepristone, RU-486, nefazodone, some azole antifungals)
Decrease: enzalutamide effects—CYP3A4 inducers (barbiturates, bosentan, carBAMazepine, dexamethasone, nevirapine, OXcarbazepine, phenytoin, rifabutin, rifampin, rifapentine)
Drug/Lab Test
Might require dosage change when used with St. John's wort

NURSING CONSIDERATIONS

Assess:
⚠ **Male-mediated teratogenicity:** a condom and another effective birth control method should be used if patient is having sex with a woman of childbearing potential during and 3 mo after end of therapy
⚠ **Seizures:** those with a history of seizures, underlying head trauma with loss of consciousness, TIA within 12 mo, stroke, brain tumor, or drugs lowering seizure threshold, should be told about danger of loss of consciousness when engaging in activities
⚠ For hot flashes, assure patient that these are common side effects

Evaluate:
• Therapeutic response: decreased tumor size, decreased spread of malignancy
Teach patient/family:
• That infertility can occur
⚠ To use a condom and another form of birth control during and for 3 mo after end of therapy if female sex partner is of child bearing potential
⚠ That those with seizure disorders might experience seizures because seizure threshold is decreased
• Not to use other products unless approved by prescriber

icosapent

(eye-koe'sa-pent)

Vascepa

Func. class.: Antilipidemic

Chem. class.: Omega-3 fatty acid ethylester

ACTION: Inhibits hepatic very low density lipoprotein (VLDL) and triglyceride synthesis; enhances clearance of triglycerides from circulating VLDL particles

USES: As adjunct to diet in adults with severe hypertriglyceridemia (≥500 mg/dl)

CONTRAINDICATIONS:
Hypersensitivity to icosapent ethyl
Precautions: Hepatic disease, bleeding, breastfeeding, children, fish/shellfish hypersensitivity, thrombolytic/anticoagulation therapy, pregnancy C

DOSAGE AND ROUTES

• **Adult: PO** 2 g bid
Available forms: Soft gel cap 1 g
Administer:
• Give with food, swallow whole
• Store at room temperature

SIDE EFFECTS

HEMA: Ecchymosis, epistaxis
MS: Arthralgia

PHARMACOKINETICS

Peak 5 hr, protein binding 99%, half-life 89 hr

INTERACTIONS

Increase: effects of anticoagulants, platelet inhibitors, thrombolytics
Drug/Lab Test
Increase: bleeding time

NURSING CONSIDERATIONS

Assess:
Hypertriglyceridemia:
• Obtain diet history including fat, cholesterol in diet; cholesterol, triglyceride levels periodically during treatment
Liver disease:
• Monitor LFTs baseline, periodically in those with liver disease
Bleeding:
• Monitor ecchymosis, epistaxis, bleeding time; use cautiously in anticoagulant/thrombolytic therapy
Fish/shellfish hypersensitivity:
• Identify fish hypersensitivity, use cautiously
Evaluate:
• Therapeutic response: decrease in triglycerides
Teach patient/family:
• That blood work may be necessary during treatment
• To report bleeding if anticoagulants or thrombolytics are used
• Not to break, crush, open, or dissolve caps
• That previously prescribed regimen will continue: low-cholesterol diet, exercise program, smoking cessation

RARELY USED

ivacaftor
(eye'va-kaf'tor)
Kalydeco
Func. class.: Respiratory agent

USES: Cystic fibrosis in those with G551D mutation in the *CFTR* gene

DOSAGE AND ROUTES

• **Adult/adolescent/child ≥6 yr: PO** 150 mg every 12 hr with fat-containing food

linaclotide
(lin'a-kloe'tide)
Linzess
Func. class.: Functional GI disorder agent
Chem. class.: Selective guanylate cyclase C agonist

ACTION: Acts locally on the luminal surface of the intestinal epithelium; stimulates secretion of chloride and bicarbonate into the intestinal lumen; this action results in increased intestinal fluid and accelerated GI transit

USES: Irritable bowel syndrome (IBS) with constipation, chronic constipation not associated with IBS

CONTRAINDICATIONS: Hypersensitivity, urticaria, infection, sinusitis, GI obstruction

Black Box Warning: Children <6 yr, infants, neonates

Precautions: Pregnancy C, breastfeeding, diarrhea, abdominal pain, cholelithiasis, Crohn's disease, diverticulitis, fecal impaction, gastric cancer, GI disease, IBS

DOSAGE AND ROUTES

Constipation
• **Adult: PO** 145 mcg/day on empty stomach, AM
Irritable bowel syndrome
• **Adult: PO** 290 mcg/day on empty stomach, AM
Available forms: Caps 145, 290 mcg
Administer:
• Give on empty stomach, ≥30 min before first meal of day, swallow whole
• Store at room temperature

SIDE EFFECTS

CNS: Headache, fatigue
GI: Nausea, abdominal pain, diarrhea, flatulence, fecal incontinence, vomiting, GERD, GI bleeding

PHARMACOKINETICS

Minimally absorbed, metabolized within the GI tract

INTERACTIONS

Do not use with antidiarrheals
Decrease: linaclotide effect—antimuscarinics

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Neonates/infants/children <6 yr: Can cause serious effects, including death

• GI symptoms: nausea, abdominal pain, evidence of mechanical GI obstruction; check for other sources of constipation, determine stool quality and frequency
Evaluate:
• Decreased constipation in IBS
Teach patient/family:
• To notify prescriber of GI symptoms, avoid antidiarrheals, if severe diarrhea occurs, stop product
• Do not crush, break, chew
• Pregnancy C: Avoid use in pregnancy, breastfeeding

lorcaserin

(lor-ca-ser'in)

Belviq

Func. class.: Weight-control agent (anorexiant)

Chem. class.: Serotonin 2C (5-HT_{2C}) receptor agonist

ACTION: Decreases food consumption and decreases hunger by selectively activating 5-HT_{2C} receptors

USES: Obesity management

CONTRAINDICATIONS: Pregnancy (X), breastfeeding, hypersensitivity, severe renal impairment

Precautions: Children, other organic causes of obesity, anemia, AV block, bradycardia, bundle branch block, depression, dialysis, liver/kidney disease, multiple myeloma, neutropenia, suicidal ideation, Peyronie's disease, pulmonary hypertension, sick sinus syndrome

DOSAGE AND ROUTES

Adult:

• **PO** 10 mg bid; do not exceed recommended dosage

Available forms: Tabs, film-coated 10 mg

Administer:

• For obesity if patient is on weight reduction program that includes dietary changes, exercise

• May give without regard to food

SIDE EFFECTS

CNS: Insomnia, depression, serotonin syndrome, anxiety, suicidal ideation, dizziness, headache, fatigue

CV: Bradycardia, hypertension

GI: Diarrhea, constipation, nausea

HEMA: Neutropenia, leukopenia, lymphopenia

INTEG: Rash

MS: Back pain

PHARMACOKINETICS

70% protein binding, half-life 11 hr

INTERACTIONS

Increase: life-threatening serotonin syndrome or NMS—SSRIs, SNRIs, serotonin-receptor agonists, sibutramine, MAOIs, linezolid, tricyclic antidepressants, buPROPion, lithium, DOPamine antagonist, traMADol

Increase: risk of hypoglycemia with sulfonylureas and insulin

Drug/Herb

Increase: Serotonin syndrome—St. John's wort

NURSING CONSIDERATIONS

Assess:

• Weight weekly; oral hypoglycemic dosage might need to be reduced in diabetic patients

• Monitor blood glucose, CBC with differential, Hct/Hgb, serum prolactin

⚠ Pregnancy (X): do not use in pregnancy

Suicidal Ideation:

⚠ Use caution in psychiatric disorders with emotional lability; assess for depression, suicidal thoughts/behaviors

Evaluate:

• Therapeutic response: decrease in weight

Teach patient/family:

• To avoid hazardous activities until stabilized on medication

• To discuss unpleasant side effects

⚠ To notify prescriber if pregnancy is planned or suspected, pregnancy X

lucinactant

(loo'sin-ak'tant)

Surfaxin

Func. class.: Synthetic lung surfactant

USES: Prevention of respiratory distress syndrome in premature neonates (RDS)

DOSAGE AND ROUTES

Premature neonate

Intratracheal 5.8 ml/kg birth weight divided in 4 doses; give each dose with neonate in a different position; provide positive pressure ventilation when stable; dosage may be repeated 4 times in first 48 hr

mirabegron

(mir'a-beg'ron)

Myrbetriq

Func. class.: Bladder antispasmodic

Chem. class.: β_3 Adrenergic receptor agonist

ACTION: Relaxes smooth muscles in urinary tract

USES: Overactive bladder (urinary frequency, urgency), urinary incontinence

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (C), breastfeeding, children, kidney/liver disease, bladder obstruction, dialysis, hypertension

DOSAGE AND ROUTES

• **Adult: PO** 25 mg/day, may increase to 50 mg/day if needed

Hepatic/renal dose

⚠ **PO** Child–Pugh B or (CCr 15-29 ml/min, max 25 mg/day; Child–Pugh C or CCr <15 ml/min, not recommended

Available forms: Tabs ext rel 25, 50 mg

Administer:

• Give whole; take with liquids; do not crush, chew, or break ext rel product; use without regard to meals

SIDE EFFECTS

CNS: Fatigue, dizziness, headache

CV: Hypertension

EENT: Xerophthalmia, blurred vision

GI: Nausea, vomiting, anorexia, abdominal pain, constipation, diarrhea, dyspepsia

GU: Dysuria, urinary retention, frequency, UTI, bladder discomfort

INTEG: Rash, pruritus

MISC: Arthralgia, back pain

RESP: Pharyngitis

SYST: Stevens–Johnson syndrome

PHARMACOKINETICS

71% protein binding, excretion 25% unchanged in urine, terminal half-life 50 hr, peak 3.5 hr

INTERACTIONS

Increase: Effect of digoxin, warfarin, desipramine, thioridazine, flecainide, propafenone

Increase: risk of urinary retention with antimuscarinic agents (eg, atropine, scopolamine)

NURSING CONSIDERATIONS

Assess:

• Urinary patterns: distention, nocturia, frequency, urgency, incontinence

• LFTs at baseline, periodically

• Monitor B/P

Evaluate:

• Decreasing dysuria, frequency, nocturia, incontinence

Teach patient/family:

• To avoid hazardous activities; dizziness can occur

• Not to drink liquids before bedtime

• About the importance of bladder maintenance

RARELY USED

ocriplasmin

(ok-ri-plas'min)

Jetrea

Func. class.: Ophthalmic agent

USES: Symptomatic vitreomacular adhesion

DOSAGE AND ROUTES

• **Adult: Intravitreal INJ** 0.125 mg (0.1 ml of diluted solution) by intravitreal injection to the affected eye once as a single dose

omacetaxine

(oh'ma-set-ax'een)

Synribo

Func. class.: Antineoplastic-miscellaneous

Chem. class.: Cephalotaxine ester (derived from the Evergreen tree: *Cephalotaxus harringtonia)*

ACTION: Inhibits protein synthesis by binding to site of large ribosome subunit, it reduces Bcr-Abl and Mcl-1 independent of direct Bcr-Abl binding, inducing apoptosis

USES: Chronic or accelerated phase chronic myelogenous leukemia (CML) with resistance or/and intolerance to 2 or more tyrosine kinase inhibitors

CONTRAINDICATIONS: Pregnancy (D), breastfeeding, hypersensitivity

Precautions: Children, bleeding, diabetes mellitus, female patients, geriatric patients, hyperglycemia, hyperosmolar hyperglycemic state (HHS), infection, anemia, neutropenia, thrombocytopenia

DOSAGE AND ROUTES

• **Adult: SUBCUT** 1.25 mg/m^2 bid × 14 days every 28 days

⚠ ***Grade 4 neutropenia (absolute neutrophil count [ANC] <0.5 × 10^9/L) or grade 3 thrombocytopenia (platelet count <50 × 10^9/L):*** Do not start the next cycle until the ANC is ≥1 × 10^9/L and platelets are ≥50 × 10^9/L; when therapy is resumed, reduce the number of dosing days by 2 days/cycle (initial cycles, from 14 to 12 days; maintenance cycles, from 7 to 5 days)

Available forms: Powder for injection 3.5 mg

Administer:

SUBCUT route

• **Reconstitution:** Add 1 ml of 0.9% saline for injection/vial to 3.5 mg/ml, gently swirl until the solution is clear and completely dissolved, visually inspect for particulate matter and discoloration before use, protect from light

• **Administration:** Calculate dose, withdraw into a syringe, and give as a SUBCUT injection; discard unused portion, use ≤12 hr at room temperature, ≤24 hr when refrigerated

SIDE EFFECTS

CNS: Seizures, weakness, agitation, anxiety, chills, fever, confusion, depression, dizziness, fatigue, headache, insomnia, lethargy, night sweats, tremor

CV: Hypotension, peripheral edema, sinus tachycardia

EENT: Blurred vision, change in taste (dysgeusia)

GI: Nausea, vomiting, diarrhea, abdominal pain, stomatitis

HEMA: Neutropenia, leukopenia, thrombocytopenia, anemia, bleeding

INTEG: Alopecia, rash, skin hyperpigmentation, stomatitis, skin ulcer, purpura, petechiae, pruritus

MISC: Fever

MS: Arthralgia, gout, myalgia, back pain

RESP: Dyspnea, cough, rales, sinus congestion

SYST: Infections

PHARMACOKINETICS

Protein binding ≤50%, half-life 6 hr, peak 30 min

INTERACTIONS

Increase: Bleeding risk—anticoagulants, salicylates, NSAIDs, avoid use when platelets are <50,000 cells/mL

NURSING CONSIDERATIONS

Assess:

Black Box Warning: CBC, differential, platelet count before treatment and weekly, during induction/maintenance, then every 2 wk as needed

⚠ **Pregnancy D:** assess for pregnancy before starting treatment

⚠ **Infection:** monitor temp every 4 hr; fever might indicate beginning of infection

- CV status: B/P, edema, flushing
- CNS changes: confusion, paresthesias, dysesthesia, pain, weakness

⚠ **Hypersensitive reactions, anaphylaxis:** hypotension, dyspnea, angioedema, generalized urticaria; discontinue infusion immediately

⚠ **Bone marrow depression/bleeding:** hematuria, guaiac, bruising or petechiae, mucosa or orifices every 8 hr; obtain prescription for viscous lidocaine (Xylocaine); avoid invasive procedures

- Effects of alopecia on body image; discuss feelings about body changes
- **Diabetes mellitus:** avoid in poorly controlled disease, monitor blood glucose levels frequently

Evaluate:

- Therapeutic response: decreased CML, positive hematologic response

Teach patient/family:

- To report signs of infection: fever, sore throat, flulike symptoms
- To report signs of anemia: fatigue, headache, faintness, SOB, irritability
- To report bleeding; to avoid use of razors, commercial mouthwash
- To avoid use of aspirin, ibuprofen
- That hair may be lost during treatment; that a wig or hairpiece might make patient feel better; that new hair may be different in color and texture
- That pain in muscles and joints 2-5 days after infusion is common

⚠ To use barrier contraception during and for several mo after treatment, pregnancy (D); to avoid breastfeeding

- To avoid receiving vaccinations while taking product

pazopanib

(paz-oh'pa-nib)

Votrient

Func. class.: Antineoplastic biologic response modifiers/multikinase angiogenesis inhibitor

Chem. class.: Signal transduction inhibitor (STI)

ACTION: Targets vascular endothelial growth factor receptors; a multikinase angiogenesis inhibitor

USES: Advanced renal cell carcinoma; soft-tissue sarcoma patients who have received prior chemotherapy

Unlabeled uses: Breast, ovarian cancer

CONTRAINDICATIONS: Pregnancy (D), hypothyroidism, QT prolongation, MI, wound dehiscence, hypertension

Precautions: Breastfeeding, children, cardiac/renal/hepatic/dental disease, GI bleeding

Black Box Warning: Hepatic disease

DOSAGE AND ROUTES

- **Adult: PO** 800 mg/day without food (1 hr before, 2 hr after a meal), may decrease to 400 mg/day if not tolerated (renal cell cancer); or adjust in 200-mg increments based on toxicity (soft-tissue sarcoma)

Available forms: Tabs 200 mg

Administer:

- Give on an empty stomach (1 hr before or 2 hr after a meal); separate doses by ~24 hr
- Do not crush tablets owing to the potential for an increased rate of absorption, which can affect systemic exposure; only intact, whole tablets should be used
- If a dose is missed, it should not be taken if it is <12 hr until the next dose
- Store at 77°F (25°C)

SIDE EFFECTS

CNS: Intracranial bleeding, headache
CV: Heart failure, hypertension, hypertensive crisis, chest pain, MI, QT prolongation, torsades de pointes
GI: Nausea, hepatotoxicity, vomiting, dyspepsia, GI hemorrhage, anorexia, abdominal pain, GI perforation, pancreatitis, diarrhea
HEMA: Neutropenia, thrombocytopenia, bleeding
INTEG: Rash, alopecia
MISC: Fatigue, epistaxis, pyrexia, hot sweats, increased weight, flulike symptoms, hypothyroidism, hand–foot syndrome

PHARMACOKINETICS

Protein binding 99%

INTERACTIONS

Increase: QT prolongation—class IA/III antidysrhythmics, some phenothiazines, β-agonists, local anesthetics, tricyclics, haloperidol, chloroquine, droperidol, pentamidine; CYP3A4 inhibitors (amiodarone, clarithromycin, erythromycin, telithromycin, troleandomycin), arsenic trioxide, levomethadyl; CYP3A4 substrates (methadone, pimozide, QUEtiapine, quiNIDine, risperiDONE, ziprasidone)
Increase: pazopanib concentrations—CYP3A4 inhibitors (ketoconazole, itraconazole, erythromycin, clarithromycin)
Increase: plasma concentrations of simvastatin, calcium-channel blockers, ergots
Increase: plasma concentration of warfarin; avoid use with warfarin; use low-molecular-weight anticoagulants instead
Decrease: pazopanib concentrations—CYP3A4 inducers (dexamethasone, phenytoin, carBAMazepine, rifampin, PHENobarbital)

Drug/Food
Increase: pazopanib effect—grapefruit juice; avoid use while taking product

Drug/Herb
Decrease: pazopanib concentration—St. John's wort

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Hepatic disease: fatal hepatotoxicity can occur; obtain LFTs baseline and at least every 2 wk × 2 mo, then monthly

⚠ **Fatal Bleeding:** from GI, respiratory, GU tracts, permanently discontinue in those with severe bleeding

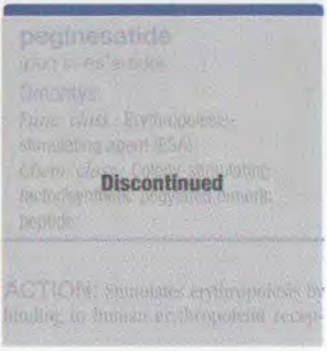
⚠ **Palmar-plantar erythrodysesthesia (hand-foot syndrome):** more common in those previously treated; reddening swelling, numbness, desquamation on palms and soles

⚠ **GI perforation/fistula:** discontinue if this occurs, assess for pain in epigastric area, dyspepsia, flatulence, fever, chills

⚠ **Hypertension/hypertensive crisis:** hypertension usually occurs in the first cycle; in those with preexisting hypertension, do not start treatment until B/P is controlled; monitor B/P every wk × 6 wk, then at start of each cycle or more often if needed, temporarily or permanently discontinue for severe uncontrolled hypertension

Evaluate:
- Therapeutic response: decreased in size, spread of tumor

Teach patient/family:
- To report adverse reactions immediately: bleeding
- About reason for treatment, expected results
- That effect on male fertility is unknown



tors, thereby increasing reticulocyte count and Hgb

USES: Anemia associated with chronic kidney disease (CKD) in patients on dialysis

CONTRAINDICATIONS: Hypersensitivity, uncontrolled hypertension

Precautions: Pregnancy (C), breastfeeding, children, seizure disorder, hypertension, chronic kidney failure, dialysis, CABG, angina, heart failure, stroke, thromboembolic disease

Black Box Warning: Hgb >11 g/dl, surgery, neoplastic disease

DOSAGE AND ROUTES

Anemia due to chronic kidney disease in patients on dialysis

• **Adult:** SUBCUT/IV 0.04 mg/kg monthly for those not receiving erythropoiesis-stimulating agent (ESA)

Anemia due to CKD in patients on dialysis and not currently receiving epoetin alfa or darbepoetin alfa

Discontinued

• **Adult:** SUBCUT/IV 2 mg/mo for epoetin ≤2500 units/wk or darbepoetin ≤12 mcg/wk; 3 mg/mo for epoetin 2500 to ≤4500 units/wk or darbepoetin 12 to ≤18 mcg/wk; 4 mg/mo for epoetin 4500 to ≤6500 units/wk or darbepoetin 18 to ≤25 mcg/wk; 5 mg/mo for epoetin 6500 to ≤8900 units/wk or darbepoetin 25 to ≤35 mcg/wk; 6 mg/mo for epoetin 8900 to ≤13,000 units/wk or darbepoetin 35 to ≤45 mcg/wk; 8 mg/mo for epoetin 13,000 to ≤19,000 units/wk or darbepoetin 45 to ≤60 mcg/wk; 10 mg/mo for epoetin 19,000 to ≤33,000 units/wk or darbepoetin 60 to ≤95 mcg/wk; 15 mg/mo for epoetin 33,000 to ≤68,000 units/wk or darbepoetin 95 to ≤175 mcg/wk; 20 mg/mo for epoetin ≥68,000 units/wk or darbepoetin ≥175 mcg/wk

Available forms: Sol for inj 10 mg/ml, 20 mg/2 ml

Administer:

• Administer IV or SUBCUT

• Single-use vials and single-use pre-

filled syringes do not contain preservatives; use only one time and discard unused portion

• Do not dilute and do not administer with other drugs

• Adjustments in dialysis prescription and anticoagulation regimens may be required after initiation

• Visually inspect for particulate matter and discoloration before use; solution should be colorless to slightly yellow

IV direct route

• Inject directly into a vein

SIDE EFFECTS

CNS: Seizures, sweating, headache, coma

CV: Hypothypertension, cardiac arrhythmias, CHF, acute MI

GI: Diarrhea, vomiting, nausea

INTEG: Infusion-related reactions, pseudocellulitis, pruritus

MISC: Infection, fever, hyperkalemia

MS: Muscle cramps, back pain

RESP: Dyspnea, cough, bronchospasm

SYST: Allergic reactions, anaphylaxis

Discontinued

PHARMACOKINETICS

Mean half-life approximately 25 hr (IV 24 hr (SUBCUT), 47.9 hr (dialysis use)

INTERACTIONS

• Do not use epoetin alfa, darbepoetin alfa with product or concurrently

Drug/Lab Test

Increase: WBC, platelets

Decrease: bleeding time

NURSING CONSIDERATIONS

Assess:

• **Anemia:** fatigue, dyspnea, pallor

Serious allergic reactions: rash, cause; if anaphylaxis occurs, stop prod administer emergency treatment

• **Renal studies:** urinalysis, pro blood BUN, creatinine; monitor dial shunts; during dialysis, heparin may to be increased

Nurse Alert

Discontinued

perampanel

(per-am'pa-nel)

Fycompa

Func. class.: Anticonvulsant

ACTION: A noncompetitive AMPA-selective receptor antagonist; inhibits calcium influx

USES: Partial onset-seizures with/without secondary generalization

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy (C), breast-feeding, children <12 yr, geriatric patients, abrupt discontinuation, depression, liver disease, kidney disease, substance abuse, suicidal ideation, driving or operating machinery

Black Box Warning: Bipolar disorder, psychosis, schizophrenia

DOSAGE AND ROUTES

- **Adult/adolescent/child ≥12 yr receiving enzyme-inducing AEDs: PO** 4 mg/day at bedtime, increase dosage every wk by 2 mg/day to 4-12 mg/day at bedtime
- **Adult/adolescent/child ≥12 yr not receiving AEDs: PO** 2 mg/day at bedtime, increase dosage every wk by 2 mg/day up to 4-8 mg/day at bedtime

Available forms: Tabs 2, 4, 6, 8, 10, 12 mg

Administer:

- Store at room temperature away from light

SIDE EFFECTS

CNS: Drowsiness, confusion, memory impairment, dizziness, fatigue, anxiety,

ataxia, agitation, emotional lability, euphoria, hostility, lethargy, memory impairment, paranoia, paresthesias, suicidal ideation, vertigo, depression
CV: Peripheral edema
EENT: Blurred vision, diplopia
GI: Constipation, nausea, vomiting, weight gain
MS: Myalgia, arthralgia
SYST: Infection

PHARMACOKINETICS

Protein binding 95%-96%, half-life 105 hr, antagonist of the AMPA receptor

INTERACTIONS

Increase: perampanel effect—CYP3A4 inducers
Increase: depression—benzodiazepines
Increase: CNS depression—alcohol, sedatives, antihistamines, all other CNS depressants
Decrease: contraception—oral/implant contraceptives with levonorgestrel/estrogen
Decrease: perampanel effect—CYP3A4 inhibitors
Drug/Herb
Decrease: perampanel effect—St. John's wort

NURSING CONSIDERATIONS

Assess:
⚠ **Seizures:** aura, location, duration, activity at onset; institute seizure precautions: padded side rails; move objects that might harm patient

Black Box Warning: Bipolar disorder, psychosis, schizophrenia: Hostility, aggression, anger, homicidal ideation can occur

⚠ **Suicidal ideation:** assess for suicidal thoughts/behaviors as early as 1 wk and any time during treatment
• Mental status: mood, sensorium, affect, behavioral changes, suicidal thoughts/behaviors; if mental status changes: notify prescriber

⚠ **Abrupt discontinuation:** can increase seizures
Evaluate:
• Therapeutic response: decreased seizure activity
Teach patient/family:
• To avoid driving, other activities that require alertness because dizziness, drowsiness can occur
⚠ Not to discontinue medication quickly after long-term use; to taper over ≥1 wk because withdrawal-precipitated seizures can occur
⚠ To notify prescriber if pregnancy is planned or suspected; to avoid breastfeeding
• Take once daily at bedtime

pertuzumab

(per-too'zoo-mab)
Perjeta
Func. class.: Antineoplastic biologic-response modifier
Chem. class.: Monoclonal antibody, antineoplastic

ACTION: Blocks liquid-dependent action of human epidermal growth factor-2 (HER2), inhibiting signal pathways

USES: First-line treatment of (HER2) positive metastatic breast cancer with trastuzumab and DOCEtaxel

CONTRAINDICATIONS:

Black Box Warning: pregnancy (category D)

Precautions: Breastfeeding, children, infants, neonates, cardiac arrhythmias, MI, cardiac disease, heart failure, hypertension, infusion-related reactions

DOSAGE AND ROUTES

• **Adult: IV** 840 mg over 60 min, then after 3 wk 420 mg over 30-60 min every 3 wk; give with trastuzumab 8 mg/kg IV over 90 min, then after 3 wk 6 mg/kg over 30-90 min every 3 wk and DOCEtaxel

75 mg/m² IV every 3 wk; dosage may be escalated to 100 mg/m²

Available forms: Solution for inj 420 mg/14 ml

Administer:

- Visually inspect for particulate matter and discoloration

Dilution and preparation

- Withdraw the calculated dose from the vial and add to 250 ml 0.9% sodium chloride to PVC or non-PVC polyolefin infusion bag; do not dilute with dextrose 5% solution
- Dilute in normal saline only; do not mix or dilute with other drugs or dextrose solutions
- Mix the diluted solution by gentle inversion; do not shake

IV infusion

- Administer the diluted solution immediately
- Do not administer as an IV push or bolus
- Give the first dose of 840 mg over 60 min and subsequent 420 mg doses over 30–60 min
- If the diluted solution is not used immediately, store at 2°-8° C for up to 24 hr

Delayed or missed doses

- If time since previous dose is <6 wk, give 420 mg IV (do not wait for next scheduled dose)
- If time since previous dose is ≥6 wk, give 840 mg IV over 60 min, followed 3 wk later by 420 mg IV over 30–60 min repeated every 3 wk
- If DOCEtaxel is discontinued, this product and trastuzumab may continue

SIDE EFFECTS

CNS: Headache, fever, *peripheral neuropathy*, chills, *fatigue*, asthenia

CV: Heart failure

EENT: Lacrimation, stomatitis

GI: *Nausea*, vomiting, diarrhea, dysgeusia

HEMA: Anemia, neutropenia

MS: Myalgia

RESP: Upper respiratory infection

SYST: Anaphylaxis, infection, antibody formation

PHARMACOKINETICS

Median half-life 18 days

NURSING CONSIDERATIONS

Assess:

HER2 overexpression:

- Testing should be done to identify HER2 overexpression before using this product

Decreased left ventricular ejection fraction (LVEF):

⚠ Can occur and is increased in those with a history of prior anthracycline use or radiotherapy to the chest; evaluate LVEF at baseline and every 3 mo; withhold therapy ×3 wk if LVEF is <40% or LVEF is 40%-45% with a 10% or greater absolute decrease from baseline; resume therapy if the LVEF is recovered to >45% or to 40%-45% with <10% absolute decrease at reassessment; if the LVEF has not improved or has declined further, consider permanently discontinuing pertuzumab and trastuzumab after a risk/benefit assessment

Infusion-related reactions/hypersensitivity:

⚠ Assess anaphylactoid reaction, acute infusion reaction, cytokine-release syndrome 60 min after the first infusion, 30 min after other infusions; monitor for pyrexia, chills, fatigue, headache, asthenia, hypersensitivity, and vomiting; if a significant reaction occurs, slow or interrupt the infusion; permanent discontinuation may be needed in severe reactions

Black Box Warning: Pregnancy: Determine if pregnancy is planned or suspected; patients who become pregnant during therapy should report exposure to the Genentech Adverse Event line at 1-888-835-2555 and enroll in the MOTHER pregnancy registry at 1-800-690-6720

Neutropenia:

⚠ Can occur, but occurs more commonly when trastuzumab is also used

Upper respiratory infection:
• Monitor for dyspnea, shortness of breath, fever
Evaluate:
• Decreased size, spread of tumor
Teach patient/family:
Black Box Warning: Counsel women of childbearing age on the need for contraception during and for 6 mo after therapy; advise patients who suspect pregnancy to contact their health care provider immediately; discontinue breastfeeding

regorafenib

(re'goe-raf'e-nib)

Stivarga

Func. class.: Antineoplastic biologic-response modifier; multikinase inhibitor

Chem. class.: Signal transduction inhibitor (STI)

ACTION: Inhibits tyrosine kinase in patients with colorectal cancer

USES: Metastatic colorectal cancer in those who have received fluoropyrimidine, oxaliplatin, irinotecan-based chemotherapy, an anti-VEGF therapy; and an anti-EGFR therapy if *KRAS* wild type

CONTRAINDICATIONS: Pregnancy (D)
Precautions: Breastfeeding, children, geriatric patients, cardiac/renal/hepatic/dental disease, fistula, GI bleeding or perforation, bone marrow suppression, infection, wound dehiscence, thrombocytopenia, neutropenia, immunosuppression
Black Box Warning: Hepatic disease

DOSAGE AND ROUTES

• **Adult: PO** 160 mg/day with a low-fat breakfast × 21 days of a 28-day cycle, cycles may be repeated
Available forms: Tabs 40 mg
Administer:
• Store at 77°F (25°C)
• Give at the same time each day with a low-fat breakfast that contains less than 30% fat such as 2 slices of white toast with 1 TBSP of low-fat margarine and 1 TBSP of jelly, and 8 oz of skim milk; or 1 cup of cereal, 8 oz of skim milk, 1 slice of toast with jam, apple juice, and 1 cup of coffee or tea
• Swallow tablets whole
• If a dose is missed, take as soon as possible that day; do not take 2 doses on the same day
Hand–foot skin reaction
⚠ Reduce to 120 mg (grade 2 palmar–plantar erythrodysesthesia); hold if grade 2 toxicity does not improve in ≤7 days or recurs; hold for ≥7 days in grade 3 toxicity; reduce to 80 mg for recurrent grade 2 toxicity; discontinue if 80 mg is not tolerated
Hypertension
⚠ Hold in grade 2 hypertension
Other severe toxicity (except hepatotoxicity)
⚠ Hold until toxicity resolves in grade 3 or 4 toxicity; consider the risk/benefits of continuing therapy in grade 4 toxicity, reduce dosage to 120 mg; if grade 3 or 4 toxicity recurs, hold until toxicity resolves, then reduce to 80 mg; discontinue in those who do not tolerate 80-mg dose
Hepatic dose
⚠ Baseline mild (Child-Pugh class A) or moderate (Child-Pugh class B): no change; baseline severe hepatic impairment (Child-Pugh class C): use not recommended; AST/ALT elevations during therapy: For grade 3 AST/AST level elevations, hold dose; if therapy is continued, reduce to 120 mg after levels recover; discontinue in those with AST/ALT > 20× ULN; AST/ ALT > 3× ULN and bilirubin >2× ULN; recurrence of AST/ALT >5× ULN despite a reduction to 120 mg

SIDE EFFECTS

CNS: Headache, tremor
CV: Hypertensive crisis, MI

EENT: Blurred vision, conjunctivitis
GI: Hepatotoxicity, GI hemorrhage, diarrhea, GI perforation, xerostomia
HEMA: Neutropenia, thrombocytopenia, bleeding
INTEG: Rash, alopecia
META: Hypokalemia
MISC: Fatigue, decreased weight, hand–foot syndrome, hypothyroidism

PHARMACOKINETICS

Protein binding 99%, metabolized by CYP3A4, UGT1A0, half-life 14-58 hr

INTERACTIONS

Increase: regorafenib concentrations—CYP3A4 inhibitors (ketoconazole, itraconazole, erythromycin, clarithromycin)
Increase: plasma concentrations of simvastatin, calcium-channel blockers, ergots
Increase: plasma concentration of warfarin; avoid use with warfarin; use low-molecular-weight anticoagulants instead
Decrease: regorafenib concentrations—CYP3A4 inducers (dexamethasone, phenytoin, carBAMazepine, rifampin, PHENobarbital)
Drug/Food
Increase: regorafenib effect—grapefruit juice; avoid use while taking product
Drug/Herb
Decrease: imatinib concentration—St. John's wort

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Hepatic disease: fatal hepatotoxicity can occur; obtain LFTs baseline and at least every 2 wk × 2 mo, then monthly

Fatal bleeding:
⚠ From GI, respiratory, GU tracts; permanently discontinue in those with severe bleeding
Palmar–plantar erythrodysesthesia (hand–foot syndrome):
⚠ More common in those previously treated; reddening swelling, numbness, desquamation on palms, soles
GI perforation/fistula:
⚠ Discontinue if this occurs, assess for pain in epigastric area, dyspepsia, flatulence, fever, chills
Hypertension/hypertensive crisis:
⚠ Hypertension usually occurs in the first cycle in those with preexisting hypertension, do not start treatment until B/P is controlled; monitor B/P every wk × 6 wk, then at start of each cycle or more often if needed, temporarily or permanently discontinue for severe uncontrolled hypertension
Evaluate:
• Therapeutic response: decrease in spread or size of tumor
Teach patient/family:
• To report adverse reactions immediately: bleeding, rash
• About reason for treatment, expected results
• That effect on male fertility is unknown

tbo-filgrastim

(fil-gras'tim)

Neutrophil

Func. class.: Biologic modifier
Chem. class.: Short-acting granulocyte colony-stimulating factor (G-CSF)

ACTION: Stimulates proliferation and differentiation of neutrophils by binding to G-CSF receptors

USES: Chemotherapy-induced neutropenia prophylaxis to reduce the duration of severe neutropenia in nonmyeloid malignancies

CONTRAINDICATIONS: Hypersensitivity
Precautions: pregnancy (C), breast-feeding, children, sickle cell disease, chemotherapy, neoplastic disease

DOSAGE AND ROUTES

• **Adult: SUBCUT** 5 mcg/kg/day

Available forms: Solution for injection 300 mcg/0.5 ml, 480 mcg/0.8 ml

Administer:

SUBCUT route

- Visually inspect for particulate matter and discoloration before use, the solution should be clear; do not shake
- Injection sites include the front of the middle thighs, the upper outer areas of the buttocks, the upper back portion of the upper arms, or the abdomen except for the 2 inches around the navel; vary sites daily
- After removing the needle shield, expel unneeded volume based on the needed dose, discard unused portions
- Inject SUBCUT, avoiding any area that is tender, red, bruised, or hard or that has stretch marks or scars; push the plunger as far as it will go, because injection of the entire contents is necessary to activate the needle guard
- Remove needle from skin while keeping plunger depressed; slowly let the plunger go to allow the empty syringe to move inside the device and guard the needle

SIDE EFFECTS

CNS: Fever, headache

GI: Nausea, vomiting, diarrhea, anorexia, abdominal pain

HEMA: Excessive leukocytosis

INTEG: Alopecia

RESP: Acute respiratory distress syndrome (ARDS)

SYST: Anaphylaxis, angioedema, sickle-cell crisis, splenic rupture

PHARMACOKINETICS

Half-life 3.2-3.8 hr

INTERACTIONS

Increase: adverse reactions—do not use this product concomitantly with antineoplastics, lithium

NURSING CONSIDERATIONS

Assess:

- Blood studies: CBC, platelet count before treatment and twice weekly; neutrophil counts may be increased for 2 days after therapy
- B/P, respirations, pulse before and during therapy
- Bone pain; give mild analgesics

Evaluate:

- Absence of severe neutropenia in cancer chemotherapy

Teach patient/family:

- About the technique for self-administration: dose, side effects, disposal of containers and needles; provide instruction sheet

teriflunomide

(ter'i-floo'noe-mide)

Aubagio

Func. class.: Multiple sclerosis agent

Chem. class.: Pyrimidine synthesis inhibitor

ACTION

Antiproliferative effects including peripheral T- and B-lymphocytes, might reduce inflammatory demyelination

USES

Reduction of the frequency of relapses or remitting MS

CONTRAINDICATIONS

Hypersensitivity

Black Box Warning: Pregnancy: X

Precautions: Breastfeeding, alcoholism, diabetes mellitus, eosinophilic pneumonia, hepatitis, jaundice, male-mediated teratogenicity, pneumonitis, pulmonary disease/fibrosis, sarcoidosis, TB, vaccination

Black Box Warning: Hepatic disease

DOSAGE AND ROUTES

- **Adult: PO** 7 or 14 mg/day

Available forms: Tabs 7, 14 mg

Administer:

PO route

- May be taken without regard to food

SIDE EFFECTS

CNS: Anxiety, headache
CV: Palpitations, hypertension, MI
EENT: Blurred vision, conjunctivitis, sinusitis
GI: Nausea, vomiting, diarrhea, cystitis
HEMA: Leukopenia, lymphopenia, neutropenia
INTEG: Acne vulgaris, alopecia, pruritus
META: Weight loss
MISC: Infection, cystitis

PHARMACOKINETICS

Protein binding >99%, median half-life 18-19 days, peak 1-4 hr

INTERACTIONS

• Do not use with leflunomide, live virus vaccines
Increase: teriflunomide effect—cycloSPORINE, eltrombopag, gefitinib
Increase: hepatotoxicity—methotrexate, HMG-CoA reductase inhibitors
Increase: hematologic toxicity—zidovudine
Increase: effect of—oral contraceptives, repaglinide, pioglitazone, rosiglitazone, PACLitaxel, naproxen, topotecan, bosentan, furosemide
Decrease: effect of—warfarin, alosetron, DULoxetine, theophylline, tiZANidine, quiNINE, tamoxifen, bendamustine, rasagiline, rOPINIRole, selegiline, propafenone, mexiletine, lidocaine, anagrelide, cloZAPine, cinacalcet, caffeine, monitor closely
Decrease: effect of teriflunomide—cholestyramine, activated charcoal

NURSING CONSIDERATIONS

Assess:
• CNS symptoms: anxiety, confusion, vertigo
• GI status: diarrhea, vomiting, abdominal pain
• Cardiac status: tachycardia, palpitations, vasodilation, chest pain
Evaluate:
• Therapeutic response: decreased symptoms of MS
Teach patient/family:
• That blurred vision can occur
• To notify prescriber if pregnancy is planned or suspected
• Not to change dosing or stop taking without advice of prescriber

tofacitinib

(toe'fa-sye'ti-nib)

Xeljanz

Func. class.: Antirheumatic agent (disease modifying), immunomodulator/biologic DMARD
Chem. class.: Janus kinase inhibitor

ACTION: Affects the signaling pathway of Janus kinase

USES: Rheumatoid arthritis (moderately to severely active) in those who have taken methotrexate with inadequate response or intolerance

CONTRAINDICATIONS: Hypersensitivity
Precautions: Pregnancy (C), breastfeeding, neonates, infants, children, geriatric patients, neoplastic disease, ulcerative colitis, neutropenia, peptic ulcer disease
Active infections, risk of lymphomas/leukemias, TB, posttransplant lymphoproliferative disorder (PTLD), kidney disease, diabetes mellitus, HIV, hypercholesterolemia
Black Box Warning: Infection, secondary malignancy

DOSAGE AND ROUTES

• **Adult: PO** 5 mg/day with or without methotrexate or other nonbiologic DMARDs
Available forms: Tabs 5 mg
Administer:
PO route
• Without regard to food

SIDE EFFECTS

CNS: Headache, paresthesias, insomnia, fatigue
CV: Hypertension
GI: Abdominal pain, nausea, liver damage, dyspepsia, vomiting, diarrhea, gastritis, GI perforation, steatosis
HEMA: Anemia, lymphocytosis, lymphopenia, neutropenia
INTEG: Rash, pruritus
MISC: Increased cancer risk, risk of infection (TB, invasive fungal infections, other opportunistic infections), may be fatal, posttransplant lymphoproliferative disorder (PTLD)

PHARMACOKINETICS

Bioavailability 70%, protein binding 40% (albumin), metabolism mediated by CYP3A4, half-life 3 hr, peak 0.5-1 hr

INTERACTIONS

• Do not use with TNF modifiers, vaccines, potent immunosuppressants, other biologic DMARDS
Increase: tofacinib effect—CYP3A4 inhibitors (amprenavir, boceprevir, delavirdine, ketoconazole, indinavir, itraconazole, dalfopristin/quinupristin, ritonavir, tipranavir, fluconazole, isoniazid, miconazole)
Decrease: tofacinib effect—CYP3A4 inducers (rifampin, rifapentine, rifabutin, primidone, phenytoin, PHENobarbital, nevirapine, nafcillin, modafinil, griseofulvin, etravirine, efavirenz, barbiturates, bexarotene, bosentan, carBAMazepine, enzalutamide, dexamethasone)

Drug/Lab Test
Increase: LFTs, cholesterol
Decrease: neutrophils, lymphocytes, Hct, Hgb

NURSING CONSIDERATIONS

Assess:
• Monitor lipid profile, Hct/Hgb WBC, LFTs
• **RA:** Pain, stiffness, ROM, swelling of joints before, during treatment

Black Box Warning: Active infection, including localized infection: evaluate and test patients for latent or active TB before use; treat with antimycobacterials before use of product; this product increases the risk of serious including fatal infections (pulmonary or extrapulmonary TB; invasive fungal infections; and bacterial, viral, and opportunistic infections); during and after use, monitor for infection including TB in those who tested negative for latent TB before use; if a serious infection develops, interrupt receipt until the infection is controlled

Black Box Warning: Secondary malignancy: lymphoma and other malignancies have been noted with product use

⚠ **Epstein–Barr virus–associated posttransplant lymphoproliferative disorder (PTLD):** in kidney transplant patients when used with this product and immunosupressives

• **Liver disease:** not recommended in severe liver disease, impairment; dose modification is needed with moderate liver impairment, monitor LFTs

⚠ **GI perforation:** assess in those with diverticulitis, peptic ulcer disease, or ulcerative colitis

⚠ **Immunosuppression:** obtain neutrophil and lymphocyte counts before use, do not start the product in lymphocyte count <500 cells/mm^3 or ANC <1000 cells/mm^3; for ANC >1000 cells/mm^3, monitor neutrophil counts after 4–8 wk and every 3 mo thereafter; lymphocyte count >500 cells/mm^3, monitor lymphocyte counts every 3 mo

⚠ **Anemia:** determine Hgb, do not start in Hgb <9 g/dl; in Hgb ≥ 9 g/dl, monitor Hgb after 4–8 wk and every 3 mo thereafter

⚠ **Pregnancy (C)/breastfeeding:** use during pregnancy only if the potential benefit justifies the potential risk to the fetus; if pregnancy occurs, enrollment in the pregnancy registry is encouraged by calling 1-877-311-8972; discontinue product or breastfeeding, serious adverse reactions can occur in nursing infants

Black Box Warning: Neoplastic disease (lymphomas/leukemias)

Evaluate:
- Therapeutic response: decreased inflammation, pain in joints, decreased joint destruction

Teach patient/family:
- Not to have vaccines while taking this product
- Not to take any live virus vaccines during treatment
- To report signs of infection, allergic reaction

Pregnancy C: teach patient to report if pregnancy is planned or suspected, do not breastfeed

vismodegib
(vis'moe-deg'ib)

Erivedge

Func. class.: Antineoplastic biologic response modifier

Chem. class.: Signal transduction inhibitor (STI)

ACTION: A hedgehog (Hh) signaling pathway inhibitor

USES: Patients who have metastatic basal cell carcinoma, locally advanced, that has recurred after surgery and who are not candidates for surgery/radiation

CONTRAINDICATIONS: Hypersensitivity, breastfeeding

Black Box Warning: Intrauterine fetal death, male-mediated teratogenicity, Pregnancy (D)

Precautions: Children, blood donation

DOSAGE AND ROUTES

- **Adult: PO** 150 mg/day

Available forms: Cap 150 mg

Administer:
- Give without regard to food
- Swallow whole, do not open or crush caps
- If a dose is missed, do not take additional dose, take at usual time
- Store at 77°F (25°C)

SIDE EFFECTS

GI: Nausea, vomiting, dysgeusia
GU: Amenorrhea, azotemia
INTEG: Alopecia
META: Hyponatremia
MISC: Fatigue, decreased weight
MS: Arthralgia

PHARMACOKINETICS

Protein binding >99%, elimination half-life 4 days

INTERACTIONS

Increase: effect of each product—Pgp inhibitors (amiodarone, clarithromycin, cycloSPORINE, diltiazem, erythromycin, indinavir, itraconazole, ketoconazole, nelfinavir, niCARdipine, propafenone, quiNIDine, ritonavir, saquinavir, tacrolimus, tamoxifen, verapamil); CYP2C19 substrates (amitriptyline, clomiPRAMINE, imipramine, citalopram, diazepam, phenytoin, PHENobarbital, lansoprazole, omeprazole, pantoprazole, RABEprazole, esomeprazole, clopidogrel, proguanil, propranolol, carisoprodol, chloramphenicol, cyclophosphamide, indomethacin, nelfinavir, nilutamide, progesterone, teniposide, warfarin)

NURSING CONSIDERATIONS

Assess:

Black Box Warning: Pregnancy D: Verify pregnancy status of all women within 7 days before starting therapy; effective contraception is needed during and for 7 mo after treatment; men receiving this product should use condoms with spermicide (even after vasectomy) during sexual intercourse with female partners and for 2 mo after the last dose; report exposure during pregnancy to the Genentech Adverse Event Line

Evaluate:
• Therapeutic response: decreased spread of tumor

Teach patient/family:

Black Box Warning: Pregnancy D: Teach patient to notify their provider immediately if pregnancy is suspected (or in a female partner for male patients); effective contraception is needed during and for 7 mo after treatment; men receiving this product should use condoms with spermicide (even after vasectomy) during sexual intercourse with female partners and for 2 mo after the last dose; if product is used during pregnancy or if the patient becomes pregnant during use, the woman (or female partner for male patients) should be apprised of the potential hazard to the fetus; encourage exposed women (either directly or through seminal fluid) to participate in the ERIVEDGE pregnancy pharmacovigilance program

• About reason for treatment, expected results

ziv-aflibercept

(ziv-a-flih'ber-sept)

Zaltrap

Func. class.: Antineoplastic biologic response modifier

Chem. class.: Signal transduction inhibitor (STI)

ACTION: An angiogenesis inhibitor, a fusion protein that binds to vascular endothelial growth factors (VEGF-A, VEGF-B) and placental growth factor 1 and 2

USES: Metastatic colorectal cancer that is resistant or has progressed after an Oxaliplatin-containing regimen in combination with 5-fluorouracil, leucovorin, irinotecan (FOLFIRI)

CONTRAINDICATIONS: Hypersensitivity

Precautions: infertility, male-mediated teratogenicity, encephalopathy, hypertension, dental work, breastfeeding, children, neonates, geriatric patients, infection, neutropenia, pregnancy C

Black Box Warning: Bleeding, GI bleeding/perforation, intracranial bleeding, surgery

DOSAGE AND ROUTES

• **Adult: IV** 4 mg/kg over 1 hr on day 1 every 2 wk in combination with the FOLFIRI regimen (irinotecan 180 mg/m^2 over 90 min on day 1 with dl-racemic leucovorin 400 mg/m^2 over 2 hr) (infused at the same time, in same Y-line; then on day 1 by 5-fluorouracil 400 mg/m^2 as a bolus, then 2400 mg/m^2 as a 46-hr cont IV inf)

Available forms: Solution for injection 100 mg/4 ml; 200 mg/8 ml

Administer:
• Give before FOLFIRI chemotherapy; visually inspect for particulate matter and discoloration before use

Dilution and preparation
• Withdraw the calculated dose, add to 0.9% sodium chloride or dextrose 5% solution to 0.6–8 mg/mL; use polyvinyl chloride (PVC) infusion bags containing bis (2-ethylhexyl) phthalate (DHEP) or polyolefin infusion bags; do not re-enter the vial after first puncture; discard any unused portion; do not mix or combine with other drugs in the same infusion bag; the diluted solution may be stored refrigerated for ≤4 hr; discard any unused portion in the infusion bag

IV infusion
• Give diluted solution over 1 hr using a 0.2 micron polyethersulfone filter; do not use nylon or polyvinylidene fluoride (PVDF) filters; do not give IV push or bolus; do not mix or combine with other drugs in the same IV line; give using an infusion set made of one of the following: PVC containing DEHP, DEHP-free PVC containing trioctyl-trimellitate (TOTM), polypropylene, polyethylene-lined PVC, or polyurethane

Dosage adjustments for recurrent or severe hypertension

⚠ Hold until B/P is controlled and then permanently reduce dose to 2 mg/kg; discontinue in hypertensive crisis or hypertensive encephalopathy

Dosage adjustments for proteinuria (2 g/24 hr)

⚠ Hold until proteinuria is <2 g/24 hr; if proteinuria recurs, hold therapy until proteinuria is <2 g/24 hr, then reduce to 2 mg/kg; discontinue in nephrotic syndrome or thrombotic microangiopathy

SIDE EFFECTS

CNS: Intracranial bleeding, headache, dizziness

CV: Hypertensive crisis, hypertension, stroke

GI: Nausea, hepatotoxicity, dyspepsia, GI hemorrhage, abdominal pain, GI perforation

GU: Proteinuria, hematuria

HEMA: Neutropenia, leukopenia

INTEG: Rash, pruritus, alopecia, hypersensitivity

MISC: Fatigue, epistaxis, night sweats, decreased weight, flulike symptoms, infection

RESP: Dyspnea, pulmonary embolism

PHARMACOKINETICS

Elimination half-life 6 days

NURSING CONSIDERATIONS

Assess:

⚠ **Severe bleeding:** GI bleeding, intracranial bleeding, and pulmonary hemorrhage/hemoptysis may be fatal; monitor patients for signs and symptoms of bleeding

⚠ **GI perforation:** some cases are fatal; monitor patients for signs and symptoms of GI perforation; discontinue therapy if GI perforation develops

• **Poor wound healing**: hold ≥4 wk before elective surgery; after major surgery, do not restart for ≥4 wk and until the surgical wound is entirely healed

⚠ **Severe hypertension/hypertensive crisis:** usually occurs within the first 2 cycles (grade 3 or 4 hypertension); monitor B/P every 2 wk or more often if needed; treatment with antihypertensives may be needed; product may need to be discontinued

⚠ **Severe proteinuria/nephrotic syndrome/thrombotic microangiopathy (TMA):** monitor urine protein by dipstick analysis and urinary protein–to–creatinine ratio (UPCR); obtain a 24-hr urine collection for a UPCR >1; for proteinuria of 2 g/24 hr, temporarily hold doses until proteinuria is <2 g/24 hr; if proteinuria recurs, hold doses until proteinuria is <2 g/24 hr, then permanently reduce; discontinue in nephrotic syndrome or TMA

⚠ **Febrile neutropenia, neutropenic infection/sepsis:** monitor CBC with differential at baseline and before each cycle, hold FOLFIRI until the neutrophil count is $\geq 1.5 \times 10^9$/L

⚠ **Geriatric toxicity:** assess for diarrhea, dizziness, asthenia, weight loss, and dehydration that can indicate toxicity

⚠ **Pregnancy C/Breastfeeding:** highly effective contraception during and up to 3 mo after the last dose is needed for all patients of reproductive potential because infertility and male-mediated teratogenicity can occur; infertility can occur but is reversible within 18 wk after stopping product: do not breastfeed

Evaluate:

• Therapeutic response: decrease in spread of size of tumor

Teach patient/family:

Pregnancy C/breastfeeding:

⚠ That highly effective contraception should be used during and up to 3 mo after the last dose in all patients of reproductive potential, infertility and male-mediated teratogenicity can occur; infertility is reversible within 18 wk after stopping product; do not breastfeed

• About reason for treatment, expected results

⚠ Notify prescriber immediately of bleeding, severe abdominal pain, poor wound healing

Appendix B

Ophthalmic, otic, nasal, and topical products

OPHTHALMIC PRODUCTS

ANESTHETICS

lidocaine (Rx)
Akten

proparacaine (Rx)
(proe-par'a-kane)
Alcaine, Diocaine ♣, Parcaine

tetracaine (Rx)
(tet'ra-kane)
Tetcaine, TetraVisc

ANTIHISTAMINES

alcaftadine (Rx)
Lastacaft

emedastine (Rx)
(ee-med'ah-steen)
Emadine

olopatadine (Rx)
(oh-loh-pat'ah-deen)
Pataday, Patanol

ANTIINFECTIVES

azithromycin (Rx)
(ay-zi-thro-my'sin)
AzaSite

besifloxacin (Rx)
(be'si-flox'a-sin)
Besivance

ganciclovir (Rx)
(gan-sye'kloe-vir)
Zirgan

levofloxacin (Rx)
(lee-voh-floks'a-sin)

natamycin (Rx)
(nat-a-mye'sin)
Natacyn

ofloxacin (Rx)
(oh-flox'a-sin)
Ocuflox

silver nitrate 1% (Rx)
silver nitrate

sulfacetamide sodium (Rx)
(sul-fa-seet'a-mide)
Bleph-10

tobramycin (Rx)
(toe-bra-mye'sin)
Tobrasol, Tobrex

trifluridine (Rx)
(trye-floor'i-deen)
Viroptic

β-ADRENERGIC BLOCKERS

betaxolol (Rx)
(beh-tax'oh-lole)
Betoptic S

levobunolol (Rx)
(lee-voe-byoo'no-lole)
Betagen

metipranolol (Rx)
(met-ee-pran'oh-lole)
OptiPranolol

CARBONIC ANHYDRASE INHIBITORS

brinzolamide (Rx)
(brin-zoh'la-mide)
Azopt

CHOLINERGICS (Direct-acting)

acetylcholine Rx)
(ah-see-til-koe'leen)
Miochol-E

carbachol (Rx)
(kar'ba-kole)
Isopto Carbachol

pilocarpine (Rx)
(pye-loe-kar'peen)
Isopto Carpine, Pilopine HS

CHOLINESTERASE INHIBITORS

echothiophate (Rx)
(ek-oh-thye'eh-fate)
Phospholine Iodide

CORTICOSTEROIDS

fluocinolone (Rx)
(floo-oh-sin'oh-lone)
Retisert

fluorometholone (Rx)
(flure-oh-meth'oh-lone)
Flarex, FML, Liquifilm, FML Forte, FML S.O.P.

loteprednol (Rx)
(loe-tee-pred'nole)
Alrex, Lotemax

prednisoLONE (Rx)
(pred-niss'oh-lone)
Econopred, Omnipred, Pred Mild, Pred-Forte

rimexolone (Rx)
(ri-mex'a-lone)
Vexol

MYDRIATICS

atropine (Rx)
(a'troe-peen)
Atropine Care, Isopto Atropine

cyclopentolate (Rx)
(sye-kloe-pen'toe-late)
Cyclogyl, Cylate

homatropine (Rx)
(home-a'troe-peen)
Isopto Homatropine

phenylephrine (OTC)
(fen-ill-ef'rin)
Neofrin, Mydfrin

scopolamine (Rx)
(skoe-pol'a-meen)
Isopto Hyoscine

tropicamide (Rx)
(troe-pik'a-mide)
Mydral, Mydriacyl

NONSTEROIDAL ANTIINFLAMMATORIES

diclofenac (Rx)
(dye-kloe'fen-ak)

flurbiprofen (Rx)
(flure-bih-proh'fen)
Ocufen

nepafenac (Rx)
(ne-pa-fen'ak)
Ilevro, Nevanac

SYMPATHOMIMETICS

apraclonidine (Rx)
(a-pra-klon'i-deen)
Iopidine

OPHTHALMIC DECONGESTANTS/ VASOCONSTRICTORS

Iodoxamide
(loe-dox'a-mide)
Alomide

oxymetazoline (Rx)
(ox-i-meth'oh-leen)
Visine L.R.

tetrahydrozoline (OTC)
(tet-ra-hye-dro'zoe-leen)
Opticlear, Visine Original

MISCELLANEOUS OPHTHALMICS

travoprost (Rx)
(tra'voe-prost)
Travatan Z

unoprostone (Rx)
(un-oh-proe'stone)
Rescula

β-Adrenergic blockers

ACTION: Reduces production of aqueous humor by unknown mechanism

USES: Ocular hypertension, chronic open-angle glaucoma

Anesthetics

ACTION: Decreases ion permeability by stabilizing neuronal membrane

USES: Cataract extraction, tonometry, gonioscopy, removal of foreign objects, corneal suture removal, glaucoma surgery (ophthalmic); pruritus, sunburn, toothache, sore throat, cold sores, oral pain, rectal pain and irritation, control of gagging (topical)

Antiinfectives

ACTION: Inhibits folic acid synthesis by preventing PABA use, which is necessary for bacterial growth

Uses: Conjunctivitis, superficial eye infections, corneal ulcers, prophylaxis against infection after removal of foreign matter from the eye

Antiinflammatories

ACTION: Decreases inflammation, resulting in decreased pain, photophobia, hyperemia, cellular infiltration

USES: Inflammation of eye, eyelids, conjunctiva, cornea; uveitis, iridocyclitis, allergic conditions, burns, foreign bodies, postoperatively in cataract

Carbonic anhydrase inhibitor

ACTION: Converted to EPINEPHrine, which decreases aqueous production and increases outflow
Uses: Open-angle glaucoma, ocular hypertension

Direct-acting miotic

ACTION: Acts directly on cholinergic receptor sites; induces miosis, spasm of accommodation, fall in intraocular pressure, caused by stimulation of ciliary, pupillary sphincter muscles, which leads to pulling away of iris from filtration angle, resulting in increased outflow of aqueous humor
Uses: Primary glaucoma, early stages of wide-angle glaucoma (less useful in advanced stages), chronic open-angle glaucoma, acute closed-angle glaucoma before emergency surgery; also neutralizes mydriatics used during eye exam; may be used alternately with mydriatics to break adhesions between iris and lens

CONTRAINDICATIONS: Hypersensitivity
Precautions: Pregnancy, breastfeeding, children, aphakia, hypersensitivity to carbonic anhydrase inhibitors, sulfonamides, thiazide diuretics, ocular inhibitors, hepatic/renal insufficiency

SIDE EFFECTS

CNS: Headache
CV: Hypertension, tachycardia, dysrhythmias
EENT: Burning, stinging
GI: Bitter taste

NURSING CONSIDERATIONS

Assess:
- Ophth exams and intraocular pressure readings
- Blood counts; hepatic, renal function tests and serum electrolytes during long-term treatment

Perform/provide:
- Storage at room temperature away from light

Evaluate:
- Positive therapeutic response
- Absence of increased intraocular pressure

Teach patient/family:
- How to instill drops
- That product may cause burning, itching, blurring, dryness of eye area

NASAL AGENTS

NASAL ANTIHISTAMINES

NASAL DECONGESTANTS

azelastine (Rx)
(ay-zell'ah-steen)
Astelin

desoxyephedrine (OTC)
(des-oxy-e-fed'rin)
Vicks Vapor Inhaler

EPINEPHrine (OTC)
(ep-i-neff'rin)
Adrenalin

oxymetazoline (OTC)
(ox-i-met-az'oh-leen)
12-Hour Nasal, Afrin 12-Hour Original, Afrin 12-Hour Original Pump Mist, Afrin Severe Congestion with Menthol, Afrin Sinus with Vapornase, Afrin No-Drip 12-Hour, Afrin No-Drip 12-Hour Extra Moisturizing, Dristan, Mucinex Full Force, Mucinex Moisture Smart, Neo-Synephrine 12-Hour, Vicks Sinex

phenylephrine (OTC)
(fen-ill-eff'rin)
4-Way Fast Acting Nasal Spray, Neo-Synephrine

tetrahydrozoline (OTC)
(tet-ra-hye-dro'zoe-leen)
Tyzine

NASAL CORTICOSTEROIDS

budesonide (Rx)
(byoo-des'oh-nide)
Rhinocort Aqua

fluticasone (Rx)
(floo-tic'a-son)
Flonase, Veramyst

triamcinolone (Rx)
(trye-am-sin'oh-lone)
Nasacort AQ

NONSTEROIDAL ANTIINFLAMMATORY

ketorolac (Rx)
(kee'toe-role'ak)
Sprix

ACTION: Produces vasoconstriction (rapid, long acting) of arterioles, thereby decreasing fluid exudation, mucosal engorgement by stimulation of α-adrenergic receptors in vascular smooth muscle

USES: Nasal congestion

CONTRAINDICATIONS:

Hypersensitivity to sympathomimetic amines

Precautions: Pregnancy (C), children <6 yr, geriatric, diabetes, CV disease, hypertension, hyperthyroidism, increased intracranial pressure, prostatic hypertrophy, glaucoma

DOSAGE AND ROUTES

Desoxyephedrine

- **Adult and child >6 yr: 1-2 INH** in each nostril q2hr or less

EPINEPHrine

- **Adult and child >6 yr:** Apply with swab, drops, spray prn

Oxymetazoline

- **Adult and child >6 yr: INSTILL** 2-3 gtt or sprays to each nostril bid
- **Child 2-6 yr: INSTILL** 2-3 gtt or sprays 0.025 sol bid, max 3 days

Phenylephrine

- **Adult and child >12 yr:** 2-3 drops/spray (0.25-0.5) in each nostril q3-4hr or less; or 2-3 drops/spray (1%) in each nostril q4hr or less
- **Child 6-12 yr:** 2-3 drops/spray (0.25%) in each nostril q3-4hr
- **Infant >6 mo:** 1-2 drops (0.16%) in each nostril q3hr

Tetrahydrozoline

- **Adult and child >6 yr:** 2-4 drops (0.1%) q3-4hr prn or 3-4 sprays in each nostril q4hr prn
- **Child 2-6 yr:** 2-3 drops (0.05%) in each nostril q4-6hr prn

Available forms: Nasal sol

Administer:

- Having patient tilt head back, squeeze bulb to create a vacuum, and draw correct amount of sol into dropper; insert 2 gtt of sol into nostril; repeat in other nostril
- Store in light-resistant container; do not expose to high temperature or let sol come into contact with aluminum
- For <4 consecutive days
- Environmental humidification to decrease nasal congestion, dryness

SIDE EFFECTS

CNS: Anxiety, restlessness, tremors, weakness, insomnia, dizziness, fever, headache

EENT: Irritation, burning, sneezing, stinging, dryness, rebound congestion

GI: Nausea, vomiting, anorexia

INTEG: Contact dermatitis

NURSING CONSIDERATIONS

Assess:

- For redness, swelling, pain in nasal passages before and during treatment
- For systemic absorption; hypertension, tachycardia; notify prescriber; systemic absorption occurs at high doses or after prolonged use

Evaluate:

- Therapeutic response: decreased nasal congestion

Teach patient/family:

- That stinging may occur for several applications; drying of mucosa may be decreased by environmental humidification
- To notify prescriber if irregular pulse, insomnia, dizziness, or tremors occur
- Proper administration to avoid systemic absorption
- To rinse dropper with very hot water to prevent contamination

TOPICAL GLUCOCORTICOIDS

betamethasone (augmented) (Rx)
(bay-ta-meth'a-sone)
Diprolene
desonide (Rx)
(dess'oh-nide)
LoKara, Verdeso Foam
fluocinolone (Rx)
(floo-oh-sin'oh-lone)
Derma-Smoothe/F, Synalar
flurandrenolide (Rx)
(flure-an-dren'oh-lide)
Cordran, Cordran SP, Drenison 1/4 ♣, Drenison Tape ♣
halcinonide (Rx)
(hal-sin'oh-nide)
Halog

ACTION: Antipruritic, antiinflammatory

USES: Psoriasis, eczema, contact dermatitis, pruritus; usually reserved for severe dermatoses that have not responded to less potent formulation

CONTRAINDICATIONS: Hypersensitivity, viral infections, fungal infections
Precautions: Pregnancy (C)

DOSAGE AND ROUTES

• **Adult and child:** Apply to affected area
Administer:
• Only to affected areas; do not get in eyes
• Leaving site uncovered or lightly covered; occlusive dressing is not recommended—systemic absorption may occur
• Use only on dermatoses; do not use on weeping, denuded, or infected area
• Cleansing before application of product
• Continuing treatment for a few days after area has cleared
• Store at room temperature

SIDE EFFECTS

INTEG: *Acne, atrophy, epidermal thinning, purpura, striae*

NURSING CONSIDERATIONS

Assess:
• Temp; if fever develops, product should be discontinued
• For systemic absorption, increased temp, inflammation, irritation
Evaluate:
• Therapeutic response: absence of severe itching, patches on skin, flaking
Teach patient/family:
• To avoid sunlight on affected area, burns may occur
• To limit treatment to 14 days

TOPICAL ANTIFUNGALS

nystatin (OTC)
(nye-stat'in)
Nyamyc, Nystop, Pediaderm, Pedia-dri
selenium (OTC)
(see-leen'ee-um)
Dandrex, Selsun, Selsun Blue
terbinafine (OTC)
(ter-bin'a-feen)
Lamisil
tolnaftate (OTC)
(tole-naf'tate)
Absorbine Athlete's Foot Cream, Fungi-Guard, Tinactin
undecylenic acid (OTC)
(un-deh-sih-len'ik)

ACTION: Interferes with fungal cell membrane permeability

USES: Tinea cruris, tinea pedis, diaper rash, minor skin irritations; amphotericin B is used for candida infections

CONTRAINDICATIONS: Hypersensitivity
Precautions: Pregnancy (B), breastfeeding, children

DOSAGE AND ROUTES

• Massage into affected area, surrounding area daily or bid, continue for 7-14 days, not to exceed 4 wk
Administer:
Topical route
• To affected area, surrounding area; do not cover with occlusive dressings
• Store below 86° F (30° C)

SIDE EFFECTS

INTEG: Burning, stinging, dryness, itching, local irritation

NURSING CONSIDERATIONS

Assess:
• Skin for fungal infections; peeling, dryness, itching before and throughout treatment
• For continuing infection; increased size, number of lesions
Evaluate:
• Therapeutic response: decrease in size, number of lesions
Teach patient/family:
• To apply with glove to prevent further infection; not to cover with occlusive dressings
• That long-term therapy may be needed to clear infection (2 wk-6 mo depending on organism); compliance is needed even after feeling better
• Proper hygiene; hand-washing technique, nail care, use of concomitant top agents if prescribed
• To avoid use of OTC creams, ointments, lotions unless directed by prescriber
• To use medical asepsis (hand washing) before, after each application; to change socks and shoes once a day during treatment of tinea pedis
• To report to health care prescriber if infection persists or recurs; if blisters, burning, oozing, swelling occur
• To avoid alcohol because nausea, vomiting, hypertension may occur
• To use sunscreen or avoid direct sunlight to prevent photosensitivity
• To notify health care provider of sore throat, fever, skin rash, which may indicate overgrowth of organisms

TOPICAL ANTIINFECTIVES

bacitracin (OTC)
(bass-i-tray'sin)
mafenide (Rx)
(ma'fe-nide)
Sulfamylon
salicylic acid (Rx)
(sal'i-sil'ik)
silver sulfADIAZINE (Rx)
(sul-fa-dye'a-zeen)
Flamazine ♣, Silvadene, SSD, SSD AF, Thermazene
tretinoin (Rx)
(treh'tih-noyn)
Atralin, Avita, Retin-A, Renova

ACTION: Interferes with bacterial protein synthesis

USES: Skin infections, minor burns, wounds, skin grafts, primary pyodermas, otitis externa

CONTRAINDICATIONS: Hypersensitivity, large areas, burns, ulcerations
Precautions: Pregnancy (C), breastfeeding, impaired renal function, external ear or perforated eardrum
Administer:
• Enough medication to cover lesions completely

• After cleansing with soap, water before each application; dry well
• To less than 20% of body surface area when patient has impaired renal function

SIDE EFFECTS

INTEG: Rash, urticaria, scaling, redness

NURSING CONSIDERATIONS

Assess:
• Allergic reaction: burning, stinging, swelling, redness
• For signs of nephrotoxicity or ototoxicity
Perform/provide:
• Storage at room temperature in dry place
Evaluate:
• Therapeutic response: decrease in size, number of lesions

TOPICAL ANTIVIRALS

acyclovir (Rx)
(ay-sye'kloe-ver)
Zovirax
penciclovir (Rx)
(pen-sye'kloe-ver)
Denavir

ACTION: Interferes with viral DNA replication

USES: Simple mucocutaneous herpes simplex, in immunocompromised clients with initial herpes genitalis

CONTRAINDICATIONS: Hypersensitivity
Precautions: Pregnancy (C), breastfeeding
Administer:
• Using finger cot or rubber glove to prevent further infection
• Enough medication to cover lesions completely
• After cleansing with soap, water before each application; dry well

SIDE EFFECTS

INTEG: Rash, urticaria, stinging, burning, pruritus, vulvitis

NURSING CONSIDERATIONS

Assess:
• Allergic reaction: burning, stinging, swelling, redness, rash, vulvitis, pruritus
Perform/provide:
• Storage at room temperature in dry place
Evaluate:
• Therapeutic response: decrease in size, number of lesions
Teach patient/family:
• Not to use in eyes or when there is no evidence of infection
• To apply with glove to prevent further infection
• To avoid use of OTC creams, ointments, lotions unless directed by prescriber
• To use medical asepsis (hand washing) before, after each application and avoid contact with eyes
• To adhere strictly to prescribed regimen to maximize successful treatment outcome
• To begin taking product when symptoms arise

TOPICAL ANESTHETICS

benzocaine (OTC)
(ben'zoe-kane)
Americaine Anesthetic, Anbesol Maximum Strength, Baby Anbesol, Biozene, Boil-Ease, Comfort Caine, Ora-Jel

dibucaine (OTC)
(dye'byoo-kane)
Nupercainal

lidocaine (Rx, OTC)
(lye'doe-kane)
LMX, Solarcaine, Xylocaine, Xylocaine 10% oral, Xylocaine Viscous, Zilactin-L

pramoxine (OTC)
(pra-mox'een)
Pramox, Prax, Sarna

tetracaine (Rx, OTC)
(tet'ra-cane)
Pontocaine, Viractin

ACTION
Inhibits conduction of nerve impulses from sensory nerves

USES
Oral irritation, sore throat, toothache, cold sore, canker sore, sunburn, minor cuts, insect bites, pain, itching

CONTRAINDICATIONS
Hypersensitivity, infants <1 yr, application to large areas
Precautions: Pregnancy (C), children <6 yr, sepsis, denuded skin

DOSAGE AND ROUTES
• **Adult and child: TOP** apply qid as needed; **RECT** insert tid and after each BM

SIDE EFFECTS
INTEG: Rash, irritation, sensitization

NURSING CONSIDERATIONS
Assess:
• Pain: location, duration, characteristics before and after administration
• For infection: redness, drainage, inflammation; this product should not be used until infection is treated
Perform/provide:
• Storage in tight, light-resistant container; do not freeze, puncture, or incinerate aerosol container
Evaluate:
• Therapeutic response: decreased redness, swelling, pain
Teach patient/family:
• To avoid contact with eyes
• Not to use for prolonged periods: use for <1 wk; if condition remains, prescriber should be contacted

TOPICAL MISCELLANEOUS

docosanol (OTC)
(doe-koe'san-ole)
Abreva

pimecrolimus (Rx)
(pim-eh-croh'lim-us)
Elidel

ACTION
Docosanol unknown; pimecrolimus may bind with macrophilin and inhibit calcium-dependent phosphatase

USES
Docosanol applied to fever blisters to promote more rapid healing; pimecrolimus used to treat mild to moderate atopic dermatitis in nonimmunocompromised patients ≥2 yr who are unresponsive to other treatment

CONTRAINDICATIONS
Hypersensitivity
Precautions: Pregnancy (C), breastfeeding, dermal infections

DOSAGE AND ROUTES

Docosanol

• **Adult: TOP** Rub into blisters 5×/day until healing occurs

Pimecrolimus

• **Adult and child ≥2 yr: TOP** Apply thin layer 2×/day and rub in, use as long as needed

Administer:

• To skin, rub in gently

SIDE EFFECTS

Pimecrolimus

INTEG: Burning

NURSING CONSIDERATIONS

Assess:

• Skin condition (color, pain, inflammation) before and after administration

• For signs and symptoms of skin infections (redness, draining lesions); if present, avoid use of product (pimecrolimus)

Evaluate:

• Therapeutic response: decreased inflammation, redness

Teach patient/family:

• To avoid contact between medication and eyes

• To discontinue use of product when condition clears

VAGINAL ANTIFUNGALS

butoconazole (OTC)
(byoo-toh-kone'ah-zole)
Gynazol-1

miconazole (OTC)
(mye-kon'a-zole)
Monistat, Monistat 3, Monistat 7, Monistat Dual Pak

terconazole (OTC)
(ter-kone'ah-zole)
Terazol 7, Terazol 3, Zazole

tioconazole (OTC)
(tye-oh-kone'ah-zole)
Gyne-Trosyd ✤, Vagistat-1

ACTION: Interferes with fungal DNA replication; binds sterols in fungal cell membranes, which increases permeability, leaking of nutrients

USES: Vaginal, vulval, vulvovaginal candidiasis (moniliasis)

CONTRAINDICATIONS: Hypersensitivity

Precautions: Pregnancy, breastfeeding, children <2 yr

DOSAGE AND ROUTES

Butoconazole

• **Adult: VAG** 5 g (1 applicator) at bedtime × 3-6 days

Miconazole

• **Adult:** 200 mg supp at bedtime × 3 days or 100 mg supp × 1 wk

Terconazole

• **Adult:** VAG 5 g (1 applicator) at bedtime

Tioconazole

• **Adult:** 1 applicator at bedtime

Administer:

Topical route

• One full applicator every night high into the vagina

• Store at room temperature in dry place

SIDE EFFECTS

GU: Vulvovaginal burning, itching, pelvic cramps
INTEG: Rash, urticaria, stinging, burning
MISC: Headache, body pain

NURSING CONSIDERATIONS

Assess:
• For allergic reaction: burning, stinging, itching, discharge, soreness
Evaluate:
• Therapeutic outcome: decrease in itching or white discharge (vaginal)
Teach patient/family:
• About asepsis (hand washing) before, after each application
• To apply with applicator only; to avoid use of any other vaginal product unless directed by prescriber; sanitary napkin may prevent soiling of undergarments
• To abstain from sexual intercourse until treatment is completed; reinfection and irritation may occur
• To notify prescriber if symptoms persist

OTIC ANTIINFECTIVES

ciprofloxacin (Rx)

Cetraxel

ACTION: Inhibits protein synthesis in susceptible microorganisms

USES: Ear infection (external), short-term use

CONTRAINDICATIONS: Hypersensitivity, perforated eardrum
Precautions: Pregnancy (C)
Administer:
• After removing impacted cerumen by irrigation
• After cleaning stopper with alcohol
• After restraining child if necessary
• After warming sol to body temp

SIDE EFFECTS

EENT: Itching, irritation in ear
INTEG: Rash, urticaria

NURSING CONSIDERATIONS

Assess:
• For redness, swelling, fever, pain in ear, which indicates superinfection
Evaluate:
• Therapeutic response: decreased ear pain
Teach patient/family:
• The correct method of instillation using aseptic technique, including not touching dropper to ear
• That dizziness may occur after instillation

Appendix C Vaccines and toxoids

GENERIC NAME	TRADE NAME	USES	DOSAGE AND ROUTES	CONTRAINDICATIONS
advenovirus vaccine		Prevention of advenovirus types 4/7	Adult ≤50 yr/adolescent ≥17 yr in the military PO 1 tab of each 4/7 or a single dose	Pregnancy
avian influenza A (H5N1) virus vaccine		Prophylaxis	Adult: IM 1 ml (90 mcg) 2 doses, 28 days apart	IV
anthrax vaccine	BioThrax	Pre-/postexposure prophylaxis	**Preexposure** Adult: SUBCUT 0.5 ml at 0, 2, 4 wk, then 0.5 ml at 6, 12, 18 mo **Postexposure** Adult: SUBCUT 0.5 ml 0, 2, 4 wk, with antibiotics	Hypersensitivity
BCG vaccine	TICE BCG	TB exposure	Adult and child >1 mo: 0.2-0.3 ml Child <1 mo: Reduce dose by 50% using 2 ml of sterile water after reconstituting	Hypersensitivity, hypogamma-globulinemia, positive TB test, burns
cholera vaccine	No trade name	Immunization for cholera outside the United States	Adult and child >10 yr: IM/SUBCUT 2× of 0.5 ml, 7-30 days before traveling to cholera areas Booster is used q6mo 0.5 ml prn	Hypersensitivity, acute febrile illness
diphtheria and tetanus toxoids, adsorbed	No trade name	Induces antitoxins to provide immunity to diphtheria and tetanus	Adult and child ≥7 yr: IM (adult strength) 0.5 ml q4-8wk × 2 doses, then 3rd dose 6-12 mo after 2nd dose, booster IM 0.5 ml q10yr Child 1-6 yr: IM (pediatric strength) 0.5 ml q4wk × 2 doses, booster 6-12 mo after 2nd dose Infant 6 wk-1 yr: IM (pediatric strength) 0.5 ml q4wk × 3 doses, booster 6-12 mo after 3rd dose	Hypersensitivity to mercury, thimerosal; immunocompromised patients; radiation; corticosteroids; acute illness
diphtheria and tetanus toxoids and whole-cell pertussis vaccine (DPT, DTP)	DTwP, Tr-Immunol	Prevention of diphtheria, tetanus, pertussis	Doses vary Check product information	Hypersensitivity, active infection, poliomyelitis outbreak, immunosuppression, febrile illness

Continued

Appendix c Vaccines and toxoids—cont'd

Nurse Alert

GENERIC NAME	TRADE NAME	USES	DOSAGE AND ROUTES	CONTRAINDICATIONS
diphtheria and tetanus toxoids and acellular pertussis vaccine	Adacel, Boostrix, Daptacel, Infanrix, Tripedia			
diphtheria, tetanus, pertussis, haemophilus, polio IPV	Pentacel	Immunity to diphtheria, tetanus, pertussis, haemophilus, polio IPV	Infant >6 wk and child ≤5 yr: IM 0.5 ml at 2, 4, 6, and 15-18 mo	Hypersensitivity, polio outbreak, acute infection, immunosuppression
diphtheria, tetanus, pertussis, polio vaccine IPV	Kinrix	Immunity to diphtheria, tetanus, pertussis, polio vaccine IPV	Child: IM 0.5 ml	Hypersensitivity, polio outbreak, acute infection, immunosuppression
H1N1 influenza A (swine flu) virus vaccine	Influenza A (H1N1)	Immunity to H1N1	Adult <50 yr, adolescent, child ≥2 yr: Intranasal 1 dose (roughly 0.1 ml) into each nostril; child 2-9 repeat dose ≥4 wk later Adult, adolescent, child ≥3 yr: IM 0.5 ml as a single dose; child 3-9 yr repeat dose ≥4 wk later (Sanofi) (GSL); child 4-9 yr repeat dose ≥4 wk later (Novartis); infants ≥6 mo-child <36 mo: IM 0.25 ml, repeat in 4 wk (Sanofi) Adult: IM 0.5 ml as a single dose (GSK)	
haemophilus b conjugate vaccine, diphtheria CRM_{197} protein conjugate (HbOC)	HibTITER	Polysaccharide immunization of children 2-6 yr against *H. influenzae* b, conjugate	**HibTITER (IM only)** Child: IM 0.5 ml Child 2-6 mo: 0.5 ml q2mo × 3 inj	Hypersensitivity, febrile illness, active infection
haemophilus b conjugate vaccine, meningococcal protein conjugate (PRP-OMP)	PedvaxHIB	Immunization of child 2, 4, 6 mo	Child 7-11 mo: Previously unvaccinated 0.5 ml q2mo inj Child 12-14 mo: Previously unvaccinated 0.5 ml × 1 inj **PedvaxHIB (IM only)** Child 2-14 mo: 0.5 ml × 2 inj at 2, 4 mo of age (6 mo dose not needed), then booster at 12-18 mo against invasive disease Child ≥15 mo: Previously unvaccinated 0.5 ml inj	

hepatitis A vaccine, inactivated	Havrix, VAQTA	Active immunization against hepatitis A virus	Adult: IM 1440 EL units (Havrix) or 50 units (VAQTA) as a single dose; booster dose is the same given at 6, 12 mo Child 2-18 yr: IM 720 EL units (Havrix) or 25 units (VAQTA) as a single dose, booster dose is the same given at 6, 12 mo	Hypersensitivity
hepatitis B vaccine, recombinant	Engerix-B, Recombivax HB	Immunization against all subtypes of hepatitis B virus	Varies widely	Hypersensitivity to this vaccine or yeast
herpes zoster virus vaccine	Zostavax	Prevention of herpes zoster	Adult ≥60 yr: SUBCUT 0.65 ml	<60 yr, child, infant, AIDS, IM/IV, leukemia, lymphoma, pregnancy
human papillomavirus recombinant vaccine, quadrivalent	Gardasil	Prevention of HPV types 6, 11, 16, 18, cervical cancer, genital warts, precancerous dysplasic lesions, anal cancer/anal intraepithelial neoplasia	Adult up to 26 yr and child >9 yr to 26 yr: IM give as 3 separate doses; 1st dose as elected; 2nd dose 2 mo after 1st dose; 3rd dose 6 mo after 1st dose	Child <9 yr, pregnancy, breastfeeding, geriatric, active disease, hypersensitivity
influenza virus vaccine	Afluria, FluMist, Fluogen, Flu-Shield, Fluviral*, Fluvirin, Fluzone, influenza virus vaccine, trivalent	Prevention of Russian, Chilean, Philippine influenza	Adult and child >12 yr: IM 0.5 ml in 1 dose Adult 18-64 yr: ID 0.1 ml as a single dose Child 3-12 yr: IM 0.5 ml, repeat in 1 mo (split) unless 1978-1985 vaccine was given; also given nasal Child 6 mo to 3 yr: IM 0.25 ml, repeat in 1 mo (split) unless 1978-1985 vaccine was given; also given nasal child ≤2 yr	Hypersensitivity, active infection, chicken egg allergy, Guillain-Barré syndrome, active neurologic disorders
Japanese encephalitis virus vaccine, inactivated	JE-VAX	Active immunity against Japanese encephalitis (JE)	Adult and child ≥3 yr: SUBCUT 1 ml, days 0, 7, 30; booster SUBCUT 1 ml 2 yr after last dose Child 1-3 yr: SUBCUT 0.5 ml, days 0, 7, 30; booster SUBCUT 0.5 ml 2 yr after last dose	Hypersensitivity to murine, thimerosal; allergic reactions to previous dose

Continued

Nurse Alert

Appendix c Vaccines and toxoids—cont'd

GENERIC NAME	TRADE NAME	USES	DOSAGE AND ROUTES	CONTRAINDICATIONS
Lyme disease vaccine (recombinant OspA)	LYMErix	Immunization against Lyme disease	Adult and adolescent 15-70 yr: IM 30 mcg in deltoid, repeat at 1, 12 mo after first dose	Hypersensitivity, antibiotic refractory Lyme arthritis
measles and rubella virus vaccine, live attenuated	M-R-Vax II	Immunity to measles and rubella by antibody production	Adult and child ≥15 mo: SUBCUT 0.5 ml (1000 units)	Hypersensitivity, immunocompromised patients, active untreated TB, cancer, blood dyscrasias, radiation, corticosteroids, pregnancy; allergic reactions to neomycin, eggs
measles, mumps, and rubella vaccine, live	M-M-R-II	Prevention of measles, mumps, rubella	Adult: SUBCUT 1 vial; 2 vials separated by 1 mo, in person born after 1957 Child >15 mo and adult: SUBCUT 0.5 ml	Hypersensitivity, blood dyscrasias, anemia, active infection, immunosuppression; egg, chicken allergy; pregnancy, febrile illness, neomycin allergy, neoplasms
measles, mumps, rubella, varicella	ProQuad	Immunity to measles, mumps, rubella, varicella	Child: SUBCUT 0.5 ml	Hypersensitivity to eggs, neomycin, cancer, radiation, corticosteroids, blood dyscrasias, active untreated TB
measles virus vaccine, live attenuated	Attenuvax	Immunity to measles by antibody production	Adult and child ≥15 mo: SUBCUT 0.5 ml (1000 units), 1 dose 15 mo, 2nd dose age 4-6 or 11, or 12	Hypersensitivity to eggs, neomycin; cancer, radiation, corticosteroids, pregnancy, immunocompromised patients, blood dyscrasias, active untreated TB
meningococcal diphtheria toxoid conjugate vaccine	Menomune, Menactra, Menveo	Prophylaxis to meningococcal meningitis/diphtheria	All doses are different; check product information	Latex hypersensitivity
meningococcal polysaccharide vaccine	Menomune-A/C/Y/W-135, Menactra	Prophylaxis to meningococcal meningitis	Adult and child >2 yr: SUBCUT 0.5 ml	Hypersensitivity to thimerosal, pregnancy, acute illness
mumps virus vaccine, live	Mumpsvax	Active immunity to mumps	Adult and child ≥1 yr: SUBCUT 0.5 ml (20,000 units)	Hypersensitivity to eggs, neomycin; cancer, radiation, corticosteroids, pregnancy, immunocompromised patients, blood dyscrasias, active untreated TB

plague vaccine	No trade name	Active immunity to *Yersinia pestis* plague	Adult: IM 1 ml, then 0.2 ml in 4-12 wk, then 0.2 ml 5-6 mo after 2nd dose; booster 0.1-0.2 ml q6mo when in plague area	Hypersensitivity to phenol, sulfites, formaldehyde, beef, soy, casein; pregnancy, coagulation disorders
pneumococcal 7-valent conjugate vaccine	Prevnar	Immunity against *Streptococcus pneumoniae*	Child: IM 0.5 ml × 3 doses (7-11 mo); × 2 doses (12-23 mo); × 1 dose >2-9 yr	Hypersensitivity to diphtheria toxoid or this product
pneumococcal vaccine, polyvalent	Pneumovax 23, Pnu-Imune 23	Pneumococcal immunization	Adult and child >2 yr: IM/SUBCUT 0.5 ml	Hypersensitivity, Hodgkin's disease, ARDS
poliovirus vaccine, live, oral, trivalent (TOPV) poliovirus vaccine (IPV)	Orimune, IPOL	Prevention of polio	Adult and child >2 yr: PO 0.5 ml, given q8wk × 2 doses, then 0.5 ml ½-1 yr after dose 2 Infant: PO 0.5 ml at 2, 4, 18 mo; booster at 4-6 yr; may also be given: IPV at 2, 4 mo, then TOPV at 12-18 mo, booster at 4-6 yr	Hypersensitivity, active infection, allergy to neomycin/streptomycin, immunosuppression, vomiting, diarrhea
rabies vaccine, adsorbed	No trade name	Active immunity to rabies	**Preexposure** Adult and child: IM 1 ml day 0, 7, 21, or 28 days (total 3 doses); booster IM 1 ml prn q2-5yr **Postexposure** Adult and child not vaccinated: IM 20 international units/kg of human rabies immune globulin (HRIG), give 5 total doses of 1-ml inj of rabies vaccine on days 0, 3, 7, 14, 28	Severe hypersensitivity to previous inj of vaccine, thimerosol
rabies vaccine, human diploid cell (HDCV)	Imovax Rabies, Imovax Rabies I.D.	Active immunity to rabies	**Preexposure** Adult and child: IM 1 ml day 0, 7, 21, or 28 (total 4 doses) **Postexposure** Adult and child: IM 1 ml on day 0, 3, 7, 14, 28 (total 5 doses)	No contraindications

*Canada only.

Continued

Nurse Alert

Appendix c Vaccines and toxoids—cont'd

GENERIC NAME	TRADE NAME	USES	DOSAGE AND ROUTES	CONTRAINDICATIONS
rotovirus	RotaTeq, Rotarix	Prevents rotovirus	Infant: PO 3 doses given between 6 and 32 wk of age; 1st dose between 6-12 wk of age; 2nd and 3rd doses q4-10wk	Hypersensitivity to this product or latex, immunocompromised, blood products given within 6 wk, lymphatic disorders
rubella and mumps virus vaccine, live	Biavax II	Immunity to rubella and mumps by antibody production	Adult and child ≥1 yr: SUBCUT 0.5 ml	Hypersensitivity to eggs, neomycin; cancer, radiation, corticosteroids, pregnancy, immunocompromised patients, blood dyscrasias, active untreated TB
rubella virus vaccine, live attenuated (RA 27/3)	Meruvax II	Immunity to rubella by antibody production	Adult and child ≥1 yr: SUBCUT 0.5 ml (1000 units)	Hypersensitivity to eggs, neomycin; cancer, radiation, corticosteroids
smallpox vaccine	ACAM 2000, Dry Vax	Prevention of smallpox	See package insert	No contraindications
tetanus toxoid, adsorbed/tetanus toxoid	No trade name	Tetanus toxoid: Used for prophylactic treatment of wounds	Adult and child: IM 0.5 ml q4-6wk × 2 doses, then 0.5 ml 1 yr after dose 2 (adsorbed); SUBCUT/IM 0.5 ml q4-8wk × 3 doses, then 0.5 ml 1/2-1 yr after dose 3, booster dose 0.5 ml q10yr	Hypersensitivity, active infection, poliomyelitis outbreak, immunosuppression
typhoid vaccine, parenteral typhoid vaccine, oral	No trade name Vivotif Berna Vaccine	Active immunity to typhoid fever	Adult: PO 1 cap 1 hr before meals × 4 doses, booster q5yr Adult and child >10 yr: SUBCUT 0.5 ml, repeat in 4 wk, booster q3yr Child 6 mo-10 yr: SUBCUT 0.25 ml, repeat in 4 wk, booster q3yr	Parenteral: Systemic or allergic reaction, acute respiratory or other acute infection, intensive physical exercise in high temperatures Oral: Hypersensitivity, acute febrile illness, suppressive or antibiotic products
typhoid Vi polysaccharide vaccine	Typhim Vi	Active immunity to typhoid fever	Adult and child ≥2 yr: IM 0.5 ml as a single dose, reimmunize q2yr 0.5 ml IM, if needed	Hypersensitivity, chronic typhoid carriers
varicella virus vaccine	Varivax	Prevention of varicella-zoster (chickenpox)	Adult and child ≥13 yr: SUBCUT 0.5 ml, 2nd dose SUBCUT 0.5 ml 4-8 wk later	Hypersensitivity to neomycin; blood dyscrasias, immunosuppression, active untreated TB, acute illness, pregnancy, diseases of lymphatic system

yellow fever vaccine	YF-Vax	Active immunity to yellow fever	Adult and child ≥9 mo: SUBCUT 0.5 ml deeply; booster q10yr Child 6-9 mo: same as above if exposed		Hypersensitivity to egg or chicken embryo protein, pregnancy, child <6 mo, immunodeficiency
zoster vaccine, live	Zostavax	Herpes zoster prevention	Reconstitute immediately after removing from freezer; give SUBCUT as a single dose; inject total amount of single-dose vial		Immunosuppression; neomycin, gelatin allergy; children, TB, pregnancy (C)

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Entries can be identified as follows: DISEASES/DISORDERS, *DRUG CATEGORIES*, generic names, Trade Names.

Formulas

Surface area rule:

$$\text{Child dose} = \frac{\text{Surface area } (m^2)}{1.73\ m^2} \times \text{Adult dose}$$

Calculating strength of a solution:

$$\frac{\textit{Solution Strength:}}{100} = \frac{\textit{Desired Solution:}}{\text{Amount of finished solutio}}$$

$$\frac{x}{100} = \frac{\text{Amount of drug desired}}{\text{Amount of finished solutio}}$$

Calculating flow rate for IV:

$$\text{Rate of flow} = \frac{\text{Amount of fluid} \times \text{Administration set calibration}}{\text{Running time}}$$

$$\frac{x}{1} = \frac{(\text{ml})\ (\text{gtt/min})}{\text{min}}$$

Calculation of medication dosages:

Formula method:

$$\frac{\text{Amount ordered}}{\text{Amount on hand}} \times \text{Vehicle} = \text{Number of tablets, capsules, or amount of liquid}$$

Vehicle is the drug form or amount of liquid containing the dosage. Amounts used in calculation by formula must be in same system.

Ratio–proportion method:

1 tablet:tablet in mg on hand::x tablet order in mg

Know or have::Want to know or order

Multiply means and extremes, divide both sides by known amount to get x. Amounts used in equation must be in same system.

Dimensional analysis method:

$$\text{Order in mg} \times \frac{\text{1 tablet or capsule}}{\text{What 1 tablet or capsule is in mg}} = \text{Tablets or capsules to be given}$$

If amounts are in different systems:

$$\text{Order in mg} \times \frac{\text{1 tablet or capsule}}{\text{What 1 tablet or capsule is in g}} \times \frac{1}{1000\ \text{mg}} = \text{Tablets or capsules to be given}$$

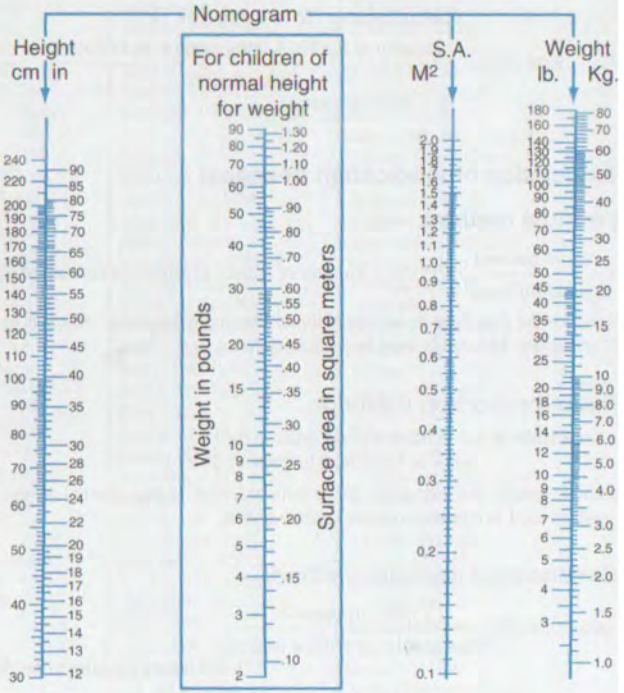
Temperature conversion:

$F = C \times {}^{9}/_{5} + 32$

$C = {}^{5}/_{9}\ (F - 32)$

Nomogram for calculation of body surface area

Place a straight edge from the patient's height in the left column to the patient's weight in the right column. The point of intersection on the body surface area column indicates the body surface area (BSA). (Reproduced in Behrman RE, Kliegman RM, Jenson HB: *Nelson textbook of pediatrics,* ed 18, Philadelphia, 2011, WB Saunders; Nomogram modified from data of E. Boyd by CD West.)



Alternative (Mosteller's formula):

$$\text{Surface area } (m^2) = \sqrt{\frac{\text{Height (cm)} \times \text{Weight (kg)}}{3600}}$$

Antitoxins and antivenins

GENERIC NAME	TRADE NAME	USES	DOSAGE AND ROUTES	CONTRAINDICATIONS
Black widow spider antivenin *(Lactrodectus mactans)*	No trade name	Black widow spider bite	Adult and child: IM 2.5 ml, 2nd dose may be given if severe; give in anterolateral thigh, obtain test for sensitivity before inj	Hypersensitivity to this product or horse serum
Crotalidae antivenom, polyvalent	No trade name	Rattlesnake bite	Adult and child: IV 20-150 ml depending on seriousness of bite, may give additional doses based on response	Hypersensitivity
Diphtheria antitoxin, equine	No trade name	Diphtheria	Adult and child: IM/slow IV 20,000-120,000 units, may give additional doses after 24 hr	Hypersensitivity
Micrurus fulvius antivenin	No trade name	East/Texas coral snake bite	Adult and child: IV 30-50 ml, give through running IV line of normal saline, give 1st 1-2 ml over 4-5 min, watch for allergic reaction	Hypersensitivity
Scorpion antivenin (centruroides sculpturatus equine)	Anascorp	Scorpion stings	Adult and child: IV 3 vial/50 ml NS given over 10 min, may give other doses 1 vial/50 ml NS over 10 min q30-60min	N/A

Abbreviations

ABG	arterial blood gas
ADA	American Diabetes Association
ADH	antidiuretic hormone
ALT	alanine aminotransferase
ANA	antinuclear antibody
APLA	antiphospholipid antibody syndrome
APTT	activated partial thromboplastin time
ASA	acetylsalicylic acid, aspirin
AST	aspartate aminotransferase (SGOT)
AV	atrioventricular
bid	twice a day
BPH	benign prostatic hypertrophy
BPM	beats per minute
BUN	blood urea nitrogen
CAD	coronary artery disease
CBC	complete blood cell count
CCr	creatinine clearance
CHF	congestive heart failure
CNS	central nervous system
CONT	continuous
COPD	chronic obstructive pulmonary disease
CPAP	continuous positive airway pressure
CPK	creatine phosphokinase
CPS	carbamoyl phosphate synthetase
C&S	culture and sensitivity
CSF	cerebrospinal fluid
CTCL	cutaneous T-cell lymphoma
CV	cardiovascular
CVA	cerebrovascular accident
CVP	central venous pressure
D&C	dilatation and curettage
DIC	diffuse intravascular coagulation
DIR INF	direct infusion
D_5W	5% glucose in distilled water
DVT	deep vein thrombosis
ECG	electrocardiogram (EKG)
EDTA	ethylenediamine tetraacetic acid
EEG	electroencephalogram
EPS	extrapyramidal symptom
ESR	erythrocyte sedimentation rate
EXT REL	extended release
FBS	fasting blood sugar
FHT	fetal heart tones
FSH	follicle-stimulating hormone
GABA	γ-aminobutyric acid
GPC	giant papillary conjunctivitis
gr	grain
GT	glucose tolerance test
GU	genitourinary
GVHD	graft-versus-host disease
H_2	$histamine_2$
hCG	human chorionic gonadotropin
Hct	hematocrit
HDCV	human diploid cell rabies vaccine
Hgb	hemoglobin
H & H	hematocrit and hemoglobin
5-HIAA	5-hydroxyindoleacetic acid
HIV	human immunodeficiency virus (AIDS)
HR	heart rate
IBD	inflammatory bowel disease
IC	intracardiac
ICP	intracranial pressure
ID	intradermal
IgG	immunoglobulin G
IM	intramuscular
INF	infusion
INH	inhalation
inj	injection
I&O	intake and output
INT	intermittent
IPPB	intermittent positive-pressure breathing
IT	intrathecal
ITP	idiopathic thrombocytopenic purpura
IUD	intrauterine device
IV	intravenous
IVP	intravenous pyelogram
K	potassium
LDH	lactic dehydrogenase
LE	lupus erythematosus
LFT	liver function test
LH	luteinizing hormone
LOC	level of consciousness
LR	lactated Ringer's solution
LT	leukotriene
m	minim
m^2	square meter
MAC	monitored anesthesia care
MAOI	monoamine oxidase inhibitor
mcg	microgram
mEq	milliequivalent
mg	milligram
MI	myocardial infarction
ml	milliliter

mm	millimeter
mo	month
Na	sodium
ng	nanogram
NGU	non-gonococcal urethritis
NHL	non-Hodgkin's lymphoma
NPO	nothing by mouth (Lat. nulla per os)
NS	normal saline
OBS	organic brain syndrome
OTC	over-the-counter
P56	plasma-lyte 56
$PaCO_2$	arterial carbon dioxide tension (pressure)
PaO_2	arterial oxygen tension (pressure)
PAT	paroxysmal atrial tachycardia
PBI	protein-bound iodine
PCI	percutaneous coronary intervention
PCWP	pulmonary capillary wedge pressure
PEEP	positive end-expiratory pressure
pH	hydrogen ion concentration
PO	by mouth
PP	postprandial
PPHN	persistent pulmonary hypertension of the newborn
prn	as required
PT	prothrombin time
PTT	partial thromboplastin time
PVC	premature ventricular contraction
pwd	powder
qAM	every morning
qhr	every hour
q2hr	every 2 hours
q3hr	every 3 hours
q4hr	every 4 hours
q6hr	every 6 hours
q12hr	every 12 hours
qid	four times daily
qPM	every night
RAIU	radioactive iodine uptake
RBC	red blood cell count or red blood cell
RECT	rectal
ROM	range of motion
SARS	severe acute respiratory syndrome
SCr	serum creatinine
SIMV	synchronous intermittent mandatory ventilation
SL	sublingual
SLE	systemic lupus erythematosus
sol	solution
STD	sexually transmitted disease
SUBCUT	subcutaneous
supp	suppository
SUS REL	sustained release
syr	syrup
TD	transdermal
tid	three times daily
tinc	tincture
TPN	total parenteral nutrition
TSH	thyroid-stimulating hormone
TT	thrombin time
UA	urinalysis
UTI	urinary tract infection
UV	ultraviolet
VMA	vanillylmandelic acid
VS	vital sign
WBC	white blood cell count

- For a list of the Institute for Safe Medicine Practices (ISMP) error-prone abbreviations, symbols and dose designations, please see http://www.ismp.org/tools/errorproneabbreviations.pdf.
- For 2012 National Patient Safety Goals, please visit The Joint Commission website at http://www.jointcommission.org/standards_information/npsgs.aspx.

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